

# Safe Cities Index 2019

Urban security and resilience in an interconnected world

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## About the report

The Safe Cities Index 2019 is a report from The Economist Intelligence Unit, sponsored by NEC Corporation. The report is based on the third iteration of the index, which ranks 60 cities across 57 indicators covering digital security, health security, infrastructure security and personal security.

The index was devised and constructed by Vaibhav Sahgal and Divya Sharma Nag. The report was written by Paul Kiestra and edited by Naka Kondo and Chris Clague. Findings from the index were supplemented with wide-ranging research and in-depth interviews with experts in the field. Our thanks are due to the following people (listed alphabetically by surname) for their time and insights:

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- Lord Bernard Hogan-Howe, former commissioner, London Metropolitan Police
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- Gino Van Begin, secretary-general, ICLEI



## Executive summary

Humanity is a predominantly urban species, with over 56% of us living in cities. By 2050 68% will do so, reflecting a speed of urbanisation even faster than previously predicted. This process is occurring most visibly in developing countries, some of which struggle to deal with the extent of change. Indeed, the challenges of urbanisation, if unmet, can entail substantial human and economic risks. On the other hand, if they are effectively addressed, the growth of cities may become an essential part of how emerging economies find a way to catch up to those in more developed countries and how humanity as a whole creates more sustainable ways to live.

Thus, urban management will play a fundamental role in defining the quality of life of most human beings in the coming years. A key element of this will be the ability of cities to provide security for their residents, businesses and visitors. Accordingly, The Economist Intelligence Unit, sponsored by NEC Corporation, maintains the Safe Cities Index (SCI)—a detailed benchmarking tool that measures a wide range of security inputs and results.

The SCI has always reflected the multifaceted nature of urban safety, with indicators divided into four distinct pillars: digital, infrastructure, health and personal security. The 2019 version (SCI2019)—which this report accompanies the release of—benefits from a major revision designed to better measure “urban resilience”. This concept—the ability of cities to absorb and bounce back from shocks—has had an increasing influence on thinking in urban safety over the last decade, especially as policymakers worry about the implications of climate change. Rather than trying to create a fifth distinct pillar of security, the index now measures new areas within the other four of particular relevance to resilience such as disaster-risk informed development policies.

The key findings from the expanded and updated SCI this year include:

- **Tokyo again comes first overall, and Asia-Pacific cities make up six of the top ten, but geographic region does not have a statistical link with results.** As it did in the previous SCI, Tokyo has the highest overall score in our index. Other cities in the top ten are Singapore (2nd), Osaka (3rd), Sydney (5th), Seoul (tied 8th) and Melbourne (10th). Two European cities are in this group, Amsterdam (4th) and Copenhagen (tied 8th), while two from America complete it, Toronto (6th) and Washington, DC (7th). However, a closer look at the important correlates of security, discussed below, found city safety is not related to global region: Tokyo, Singapore and Osaka lead because of their specific strengths, not because they happen to be in Asia.
- **The results in individual index pillars show the importance of getting the basics right.** Leo Tolstoy famously wrote, “All happy families are alike: each unhappy family is unhappy in its own way.” A look at the top five cities in each pillar—digital, health, infrastructure and personal security—yields a similar message. In each area, leading cities got the basics right, be it easy access to high-quality healthcare, dedicated cyber-security teams, community-based police patrolling or disaster continuity planning. Even among the leaders, the weaknesses of those not in first place tended to vary from city to city. Those who want to improve need to get the basics in place and then consider their own specific situations.

Looking at the index results as a whole provides a number of key insights into urban security:

- **Despite having many elements, city safety is indivisible.** The different kinds of security covered by the index require distinct interventions, often by different agencies or actors, such as health systems for medical care and police for public order. Amid this diversity, though, statistical analysis of the SCI2019 results shows that performance in each of the pillars correlates very closely with that in every other. In short, cities tend to do well, middling or poorly across every security pillar rather than having good results in one and lagging in others. This is consistent with expert commentary that, rather than representing clearly distinct fields, different kinds of safety are thoroughly intertwined and mutually supportive. Service planning and provision must take this into account. Technological investments for infrastructure, for example, can bring health benefits, while enhanced cyber-security will protect the ability of the city to provide every kind of security, not just protection of digital systems.
- **The SCI2019 results are not evenly spread but have a large number of cities clustered at the top, with the rest showing much more variation in scores.** Just 10 points separate the overall scores of the top 24 cities, while the following 36 are over 40 points apart. This does not mean that the differences in the leaders' group are unimportant. Instead, on a scale that can measure every index city, the large group of top cities are much more similar to each other than to those lagging behind.
- **Higher income sets apart those with better results, but in ways that are less than obvious.** The index scores correlate strongly with average income in the cities. In part this reflects the need to invest sometimes substantial amounts in certain areas essential to security, such as high-quality infrastructure or advanced healthcare systems. The more surprising contribution to this correlation is that, across our index, those cities with less wealth also tend to lack policy ambition. As one interviewee told us, the biggest challenges facing Sub-Saharan African cities reflect a lack of effective planning and management. Low-hanging (or at least relatively low-cost) fruit exist, which all cities that have not already done so should attempt to harvest. Doing so requires focus and perseverance.
- **Transparency matters as much as wealth to urban security.** Levels of transparency in cities, as measured by the World Bank's Control of Corruption metric, correlated as closely as income with index scores. Correlation does not guarantee causation, but interviewed experts stressed the many ways that transparency and accountability are essential in every pillar of urban security, from building safer bridges to developing the trust needed for relevant stakeholders to share information on cyber-attacks. Well-governed, accountable cities are safer cities.



- **Transparency and a new understanding of the elements of urban safety are essential to resilience.** Those parts of our index most directly related to resilience indicate that, as with safety more generally, higher incomes are associated with better preparedness. This is unsurprising: technologically advanced infrastructure, for example, if appropriately deployed, can be an important contributor to resilience. In this case, though, transparency and accountability seem to be of even greater importance: a poorly governed city will almost never be resilient.

Although not able to offer a general prescription for resilience, our research points to a number of key elements, including joint planning by all relevant stakeholders, both governmental and non-governmental, to prepare for shocks; a new understanding of infrastructure that uses a city's natural assets as tools to enhance its ability to absorb shocks; and the importance of promoting social connectedness among citizens in creating communities that will work together in a crisis.



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## Introduction: Why urban safety matters to us all

### A disorderly transition toward ever-greater urbanity

Humanity is a predominantly urban species, having become so a little over a decade ago according to UN Population Division data. And it is becoming even more so: the 56% of the world's population who live in cities today will rise to 68% by 2050.<sup>1</sup>

More than simply where most humans live, cities are where we do business, producing an outsized proportion of economic output because of a greater efficiency than rural areas. New Climate Initiative, a think-tank, estimated that in 2015 urban areas in total created 85% of the world's GDP while generating only 71% to 76% of greenhouse gas emissions.<sup>2</sup> Accordingly, the success or failure of cities will define the quality of human life in the years ahead.

This may seem like old news: urbanisation has been occurring for many decades, and for centuries in some regions. Familiarity with the long-term narrative, however, should not obscure the current challenge's novelty. First, as Adie Tomer, who leads the Metropolitan Infrastructure Initiative at the Brookings Institution, a think-tank, notes, "We have never seen cities on this scale in human history. Managing populations of 15-plus million is something new."

UN data back him up. As late as 2005, only Tokyo had more than 20m residents. Today, nine cities do, and by 2030 that number should have reached 14. Beyond the megacities, the challenge is even more daunting: today's 30 largest cities are expected to add 45m residents between 2020 and 2025, but those sized from 1-5m, because of their greater number, will have aggregate population growth of nearly 100m. Gino Van Begin, secretary-general of ICLEI, Local Governments for Sustainability, a local-government network, observes those "citizens will all need energy, water, jobs, education, food, mobility, housing [and other essentials]."

Overall, numbers tell only part of the story. Urbanisation is as uneven and disorderly as it is substantial.

On the one hand, the population shift toward cities is largely complete in developed countries: all of Australasia, Northern and Western Europe, the US and Canada, for example, are already more than 80% urban. More

<sup>1</sup> Data on urban populations of regions and populations for specific cities are, unless otherwise indicated, from United Nations Population Division, *World Urbanisation Prospects*, 2018 or Economist Intelligence Unit calculation based on those data.

<sup>2</sup> *Seizing the Opportunity*, 2015.



generally in wealthier states, over the next ten years the urban proportion of the population will stay largely flat, typically rising by 1-2% across that entire period. In some Japanese cities, such as Tokyo and Osaka, little inward migration combined with low birth rates will mean a decrease in the total population. Amid the relative safety and order of such places, it is easy to look with equanimity on the world's ongoing urbanisation.

The challenges are far more pressing elsewhere. The urbanisation of the early 21st century is a phenomenon of the developing world, which already has 25 of the world's 30 largest cities. In particular, the speed of growth within the increasing number of emerging mega-cities is historically rapid, in some cases unprecedented. Thomas Bollyky, senior fellow for Global Health at the US Council on Foreign Relations, notes that during their respective fastest decades of growth, London saw an increase of just under 100,000 residents per year and New York City 220,000. By contrast, he says, over the past ten years Dhaka grew by roughly 450,000 people annually and New Delhi by 620,000.<sup>3</sup>

Going beyond the largest cities, over the next decade the countries and regions with the fastest annual relative rise in the urban proportion of the population will include

China (1.4% per year), India (1.4%), and Sub-Saharan Africa (1.2%). In absolute terms, the change will be particularly visible in the first of these, as its percentage growth starts from a bigger numerical base: already more than half of China's population live in cities. In that country alone, during the next ten years, urban populations in aggregate will expand by 143m people, or roughly 13%.

If anything, the best demographic estimates may be having trouble keeping up with the speed of urbanisation. In 2014 and 2018 the UN Population Division projected the likely increase in the number of urban residents between 2020 and 2030. During that four-year period, demographers increased their earlier estimates for China, India and Sub-Saharan Africa by 10% to 15%.

For specific cities, this will mean the already very large challenges are now expected to be even bigger. New Delhi city planners in 2014, for example, could expect to need to address the requirements of 6.7m more residents between 2020 and 2030. Now, the likeliest figure is 8.7m.

Those arriving to join the burgeoning populations of developing world cities frequently find conditions far from easy. As Siddharth Agarwal, director of the Urban Health Resource Centre, an Indian non-

**Figure 1**

	<b>Growth in number of urban residents 2020-30 (2014 estimate, in thousands)</b>	<b>Growth in number of urban residents 2020-30 (2018 estimate, in thousands)</b>
China	124,498	142,771
India	112,312	124,243
Sub-Saharan Africa	185,942	207,495

<sup>3</sup> See also, Thomas Bollyky, *Plagues and the Paradox of Progress: Why the World is Getting Healthier in Worrisome Ways*, 2018.





government organisation (NGO), points out, “in the most rapidly growing cities, the urban disadvantaged, most of whom provide low-cost services, represent the fastest expanding segment of the population. Without these low-wage workers, living behind urban glamour, the city’s sheen, infrastructure and services cannot grow.” All too often, these individuals lead precarious lives. In China, for example, 240m people, or more than one in six of the total population, live in cities outside of their legal province of registration.<sup>4</sup> This “floating population”, lacking a right even to stay where they are—let alone access to various healthcare and other local assistance schemes—typically live with poor employment, social and housing conditions.<sup>5</sup> They also make up many of the quarter of China’s urban population who live in informal settlements. Outside of China, the proportion in slums can be higher still: in New Delhi for example, the world’s second largest city, 49% of residents are in informal settlements, and in Lagos it is over half.

It is, however, too easy to see urbanisation as a looming disaster inflicting widespread neo-Dickensian squalor on much of humanity. Certainly, the unstructured, accelerating growth of developing world cities raises the spectre of vast challenges that, if unmet, could bring substantial human misery. Simultaneously, though, it holds out the prospect of a much more hopeful future. Experts interviewed for this study stress the importance of the latter. Alioune Badiane—president of The Urban Think Tank Africa (TUTTA) based in Senegal—explains regarding his region that “some years ago, people thought

urbanisation was something evil. Now it is seen as one of the key ingredients which can help the African continent leapfrog economically.” He adds that even amid the obvious, ongoing need large numbers of city dwellers still have for basic services, progress is obvious. “Every day, the situation is improving. Urbanisation is spurring development,” he adds. Looking more globally, Mr Bollyky sees similar possibilities. “Urbanisation is a positive thing,” he says. “No country has become wealthy without urbanising first. There are challenges to be addressed, but urbanisation itself should not be regretted.”

This is not simply whistling in the dark: even the unprecedented speed of growth in today’s developing world megacities in itself is a sign of hope. The expansion of urban populations in 19th century Europe and the US came largely from inward migration, as death rates limited the natural increase of city populations through birth. Today, despite the substantial number of new arrivals to urban areas across the developing world, most urban population growth comes from babies being born in these cities and surviving.<sup>6</sup>

Urbanisation has already shaped the developed world and is redefining developing countries. It can be a blessing, a curse, or both in individual locations and for human beings as a whole. Its effect depends on how well urban governments and residents manage the challenges, both those common to all cities and specific to particular locations. This study looks at perhaps the most fundamental element of urban management: the ability to provide safety.

<sup>4</sup> “Floating Population,” Table 2-3, *China Statistical Yearbook*, 2018.

<sup>5</sup> Zai Liang et al, “Changing Patterns of the Floating Population in China during 2000-2010,” *Population Development Review*, 2014.

<sup>6</sup> Remi Jedwab et al., “Demography, Urbanization and Development: Rural Push, Urban Pull and...Urban Push?” *World Bank Policy Research Working Papers*, No. 7333, 2015.

## The many faces of security

### The Economist Intelligence Unit's Safe Cities Index 2019

Given urban security's importance, The Economist Intelligence Unit, sponsored by NEC Corporation, maintains a regularly updated index to assess the relevant strengths and weaknesses of leading cities worldwide. This publication accompanies the release of the SCl2019, its third edition, which covers 60 major urban areas.

But, for a city, what does “safe” mean? Rules of thumb can provide a useful starting point in framing an answer. Mr Badiane notes that “in any city where you can often see a woman walking alone at night, you can bet that is a safe city.” On one level, this statement seems a simple one about personal security, in particular a low likelihood of violent attack. Looking deeper, though, quickly brings up more issues. Walking alone at night also requires infrastructure, including places to walk where one is unlikely to be hit by vehicles and lighting that not only deters violence but also lets our pedestrian see where she is going. Similarly, unhealthy levels of air pollution or a lack of public health education, which mean fewer people see the value of walking, could take our notional pedestrian off the street. Finally, Mr Badiane's scene would seem far less safe were the contactless debit cards in our pedestrian's purse charged by someone with a hidden NFC reader walking in the other direction.

Safety then, even when it appears simple, is multifaceted. Accordingly, our index scores draw on 57 distinct factors, or indicators,

some of which in turn aggregate multiple data points. The environmental policy indicator, for example, looks at: whether or not a municipal environment department exists and, if so, the extent of its remit; whether the city has recently conducted an environmental review and, if so, the breadth of its coverage; and how publicly accessible environmental information is. The indicators also balance breadth and detail, covering areas as far apart as perceptions of corruption and the extent of internet access.

The indicators fall into four broad categories, or pillars: personal, infrastructure, health and digital security. Within each pillar, the relevant indicators are grouped into inputs of safety, such as policies or personnel dedicated to some aspect of security, and outcomes, which is anything from air pollution levels to crime rates.<sup>7</sup>

Put simplistically, outputs measure how safe a city currently is, while the inputs indicate which cities are doing the right things to enhance safety. Both are essential to understanding the security situation. Not only will policy likely enhance safety-related outcomes in the future, but they may also be essential to preserving them in the present. As Victor Lam, Hong Kong's government chief information officer, says of digital security, “we say we are well protected, but who knows? There are bound to be incidents. There are attacks every day. We have to be ready to respond very quickly.” Not surprisingly, the overall input and output scores correlate closely.

<sup>7</sup> For details of the scoring of the indicators and pillars, as well as, in particular, some important caveats describing the limitations of how these data are used, please see the Appendix at the end of this study.



## SCI2019 pillars and indicators



### Digital security

#### Inputs

- Privacy policy
- Citizen awareness of digital threats
- Public-private partnerships
- Level of technology employed
- Dedicated cyber-security teams

#### Outputs

- Risk of local malware threats
- Percentage of computers infected
- Percentage with internet access

### Infrastructure security

#### Inputs

- Enforcement of transport safety
- Pedestrian friendliness
- Disaster management/business continuity plan

#### Outputs

- Deaths from natural disasters
- Road traffic deaths
- Percentage living in slums
- Number of attacks on facilities/infrastructure
- Institutional capacity and access to resources
- Catastrophe insurance
- Disaster-risk informed development
- Air transport facilities
- Road network
- Power network
- Rail network
- Cyber-security preparedness

### Health security

#### Inputs

- Environmental policies
- Access to healthcare
- No. of beds per 1,000 population
- No. of doctors per 1,000 population

- Access to safe and quality food
- Quality of health services

#### Outputs

- Air quality (PM 2.5 levels)
- Water quality
- Life expectancy years
- Infant mortality
- Cancer mortality rate
- No. of biological, chemical, radiological weapons attacks
- Emergency services in the city

### Personal security

#### Inputs

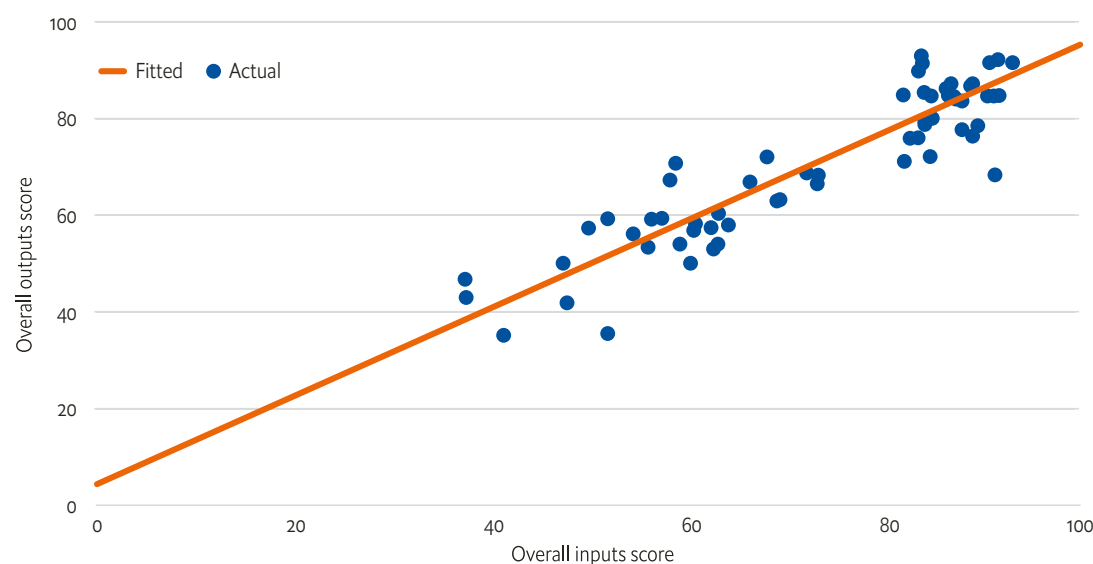
- Level of police engagement
- Community-based patrolling
- Available street-level crime data
- Use of data-driven techniques for crime
- Private security measures
- Gun regulation and enforcement
- Political stability risk
- Effectiveness of the criminal justice system
- Hazard monitoring

#### Outputs

- Prevalence of petty crime
- Prevalence of violent crime
- Organised crime
- Level of corruption
- Rate of drug use
- Frequency of terrorist attacks
- Severity of terrorist attacks
- Gender safety (female homicide)
- Perceptions of safety
- Threat of terrorism
- Threat of military conflict
- Threat of civil unrest

**Figure 2: Measuring inputs and outputs of safety**

Overall input vs output scores



### The rise of resilience and enhancements to this year's index

Any index that measures over time needs to evolve along with the field it covers. The conventional wisdom among those involved in urban safety increasingly holds that not only do a wide variety of factors matter in this field, but so too does their interaction. "A city is composed of urban systems," says Esteban Leon, chief of the risk reduction unit and head of the city resilience profiling programme at UN-Habitat. This understanding of a city is reshaping how an increasing number of urban governments approach low-frequency, high-risk events, whether involving acute disasters or longer-term threats, notably climate change and chronic social stresses.

Until recently, says Ede Ijjasz-Vasquez, senior director of the World Bank's Social, Urban, Rural and Resilience Global Practice, shocks to a city "have been seen from a sectoral perspective: health emergencies have been dealt with by the health services; floods by drainage departments; refugees by housing departments." Now, though, many cities are moving toward planning based around "resilience"—a concept that moves away from purely after-the-fact response to include system-wide preparedness and risk reduction as well. Mr Leon adds that "the evolution in thinking toward resilience has been quite steep in the last few years. Before we would analyse disasters and challenges, but not from the perspective of urban systems." He uses the analogy of the city as a healthy body. Any given



system might be able, or need, to contribute in a different way to facing a diverse range of negative events.

A lack of agreement on precisely what resilience means reflects its novelty as a working model. A recent literature review found that some use the term to emphasise how well a city responds after a disaster, while others stress how well it absorbs shocks. Similarly, some argue that the goal after a shock should be to restore the situation preceding the event as quickly as possible and others to use the opportunity for improvement over the preceding status quo.<sup>8</sup>

Although these distinctions have some policy implications, in practice the basic concept is clear. As Mr Ijjasz-Vasquez says of the World Bank, “we are beginning to define urban resilience as the ability of households, communities and cities to bounce back.” This, says Mr Leon, is “completely complementary to urban security.”

Nevertheless, Elizabeth Johnston, executive director of both the European and French Forums for Urban Security, believes that resilience is still not as integrated as it could be in urban safety considerations. There remains, she says, “a huge divide between planning for natural and man-made disasters. Cities have policies that are developed on the preparedness for the latter but not necessarily on climate change or, if they do have such policies, they are not co-ordinated. Only recently has terrorist preparedness started to include natural disasters and vice versa.” She adds that looking at these issues together within the context of overall resilience

is certainly “an emergent trend, but not something ingrained” in urban governance.

Although discussions of resilience tend to focus on preparedness for disaster, the benefits are far wider: a resilient city has the ability to perform when the world is watching. Yuriko Koike, governor of Tokyo, explains that, as her city welcomes the Rugby World Cup 2019™ and the Olympic and Paralympic Games Tokyo 2020, resilience matters not only for how it enhances security but also for the improved ability it gives the city to address the challenges the many visiting fans and athletes might face should a heatwave occur.

Previous editions of the SCI have included indicators relevant to the danger of natural and man-made shocks. In order to advance thinking on resilience, we have bolstered the number of indicators that deal with different aspects of it. The 2019 index measures for the first time things like the existence and speed of city emergency services; the existence of a disaster plan; the institutional capacity of those tasked with disaster response; the availability of disaster insurance; the ability to defend infrastructure against cyber-attacks; and the extent of hazard monitoring.

Although they come from different pillars, for analysis later in this study, the resilience-related indicators have been recombined into three new categories:

- *Damage and threat multipliers:* damage experienced from shocks—specifically natural disasters and terrorism—as well as city attributes that can exacerbate the severity of shocks.

<sup>8</sup> Adriana Sanchez et al. “The city politics of an urban age: urban resilience conceptualisations and policies,” *Palgrave Communications*,



- *Relevant assets*: the quality and extent of general assets that are useful in the event of a shock, such as different kinds of infrastructure, healthcare, emergency services and cyber-security awareness.
- *Preparation*: specific planning and

monitoring with an eye to preventing, minimising or preparing for shocks.

The accompanying chart lists which indicators have been included, as well as showing the new indicators for 2019 that have been brought in specifically to understand resilience better.

## SCI2019 resilience categories



### Damage and multipliers

- Percentage of computers infected
- No. of biological, chemical, radiological weapons attacks
- Deaths from natural disaster
- Percentage living in slums
- Number of attacks on facilities/infrastructure
- Frequency of terrorist attacks
- Severity of terrorist attacks
- Threat of terrorism
- Threat of military conflict
- Threat of civil unrest

### Relevant assets

- Citizen awareness of digital threats
- Public-private partnerships
- Dedicated cyber-security teams
- Access to healthcare

- Quality of health services
- Emergency services in the city\*
- Air transport facilities\*
- Road network
- Power network
- Rail network\*
- Community-based patrolling

### Preparedness

- Environmental policies
- Disaster management/business continuity plan
- Institutional capacity and access to resources\*
- Catastrophe insurance\*
- Disaster-risk informed development\*
- Cyber-security preparedness\*
- Hazard monitoring\*

\*New indicator for 2019.





# Insights from the index

## The SCI2019 results

The complete scores are as follows:

**Figure 3: SCI2019**

All data are normalised to a scale of 0 to 100, where 100 = best health

Very high (75.1–100) High (50.1–75) Medium (25.1–50) Low (0–25)

Overall score	1) Digital security	2) Health security	3) Infrastructure security	4) Personal security
1 Tokyo 92.0	1 Tokyo 94.4	1 Osaka 88.5	1 Singapore 96.9	1 Singapore 95.3
2 Singapore 91.5	2 Singapore 93.1	2 Tokyo 87.5	2 Osaka 94.5	2 Copenhagen 93.6
3 Osaka 90.9	3 Chicago 92.9	3 Seoul 85.2	3 Barcelona 94.4	3 Hong Kong 91.9
4 Amsterdam 88.0	4 Washington, DC 92.2	=4 Amsterdam 81.6	4 Tokyo 94.3	4 Tokyo 91.7
5 Sydney 87.9	=5 Los Angeles 91.4	=4 Stockholm 81.6	5 Madrid 94.2	5 Wellington 91.5
6 Toronto 87.8	=5 San Francisco 91.4	6 Frankfurt 81.2	6 Frankfurt 93.7	6 Stockholm 91.3
7 Washington, DC 87.6	7 Dallas 91.3	7 Washington, DC 81.1	=7 Melbourne 93.5	7 Osaka 91.1
=8 Copenhagen 87.4	8 New York 91.1	8 Singapore 80.9	=7 Sydney 93.5	8 Toronto 90.8
=8 Seoul 87.4	9 Toronto 90.6	9 Zurich 80.8	9 Wellington 93.2	9 Amsterdam 89.4
10 Melbourne 87.3	10 London 90.2	10 Taipei 80.2	10 Washington, DC 93.1	10 Sydney 89.1
11 Chicago 86.7	=11 Melbourne 89.4	=11 Copenhagen 79.8	11 Chicago 93.0	11 Abu Dhabi 88.9
12 Stockholm 86.5	=11 Osaka 89.4	=11 Sydney 79.8	=12 New York 92.5	12 Dubai 88.6
13 San Francisco 85.9	=11 Sydney 89.4	=13 Brussels 79.3	=12 Toronto 92.5	13 Zurich 87.8
14 London 85.7	14 Amsterdam 89.0	=13 Melbourne 79.3	14 Seoul 92.4	14 Frankfurt 87.7
15 New York 85.5	15 Copenhagen 87.3	15 Paris 78.7	15 Los Angeles 92.2	15 Seoul 87.5
16 Frankfurt 85.4	16 Stockholm 85.5	16 London 78.0	16 Amsterdam 92.0	16 Melbourne 86.8
17 Los Angeles 85.2	17 Seoul 84.7	17 Toronto 77.4	17 San Francisco 91.7	17 Brussels 86.3
=18 Wellington 84.5	18 Zurich 80.8	18 San Francisco 77.2	18 Hong Kong 91.1	18 Madrid 86.2
=18 Zurich 84.5	19 Wellington 80.2	19 Chicago 77.1	19 London 90.4	19 Barcelona 86.0
20 Hong Kong 83.7	20 Paris 80.0	=20 Madrid 76.1	20 Copenhagen 89.0	20 Taipei 85.8
21 Dallas 83.1	21 Frankfurt 78.9	=20 New York 76.1	21 Brussels 88.9	21 Paris 85.2
22 Taipei 82.5	22 Hong Kong 78.8	22 Dallas 75.9	22 Zurich 88.5	22 London 84.3
23 Paris 82.4	23 Taipei 77.0	23 Los Angeles 75.8	23 Stockholm 87.5	=23 Shanghai 84.0
24 Brussels 82.1	=24 Abu Dhabi 74.1	24 Barcelona 75.2	24 Taipei 87.1	=23 Washington, DC 84.0
25 Madrid 81.4	=24 Dubai 74.1	25 Rome 75.1	25 Paris 85.9	25 Beijing 83.9
26 Barcelona 81.2	26 Brussels 74.0	26 Milan 74.9	=26 Abu Dhabi 83.2	26 Chicago 83.8
27 Abu Dhabi 79.5	27 Milan 72.5	27 Hong Kong 73.2	=26 Dubai 83.2	=27 Dallas 83.3
28 Dubai 79.1	=28 Barcelona 69.2	28 Wellington 72.9	28 Rome 83.1	=27 San Francisco 83.3
29 Milan 78.1	=28 Madrid 69.2	29 Abu Dhabi 71.8	29 Milan 82.8	29 Milan 82.4
30 Rome 76.4	30 Rome 67.5	30 Moscow 71.5	30 Dallas 81.9	30 New York 82.2
<b>Average 71.2</b>	<b>Average 67.2</b>	31 Dubai 70.5	31 Istanbul 75.8	31 Kuala Lumpur 81.8
31 Beijing 70.5	31 Buenos Aires 65.0	32 Buenos Aires 69.8	32 Moscow 73.6	32 Los Angeles 81.3
32 Shanghai 70.2	32 Santiago 64.6	33 Beijing 68.0	<b>Average 72.5</b>	33 Kuwait City 80.4
33 Santiago 69.8	33 Istanbul 61.9	<b>Average 68.0</b>	33 Beijing 72.1	34 Rome 79.8
34 Buenos Aires 69.7	34 Johannesburg 60.2	34 Shanghai 67.5	34 Shanghai 72.0	35 Santiago 79.4
35 Kuala Lumpur 66.3	35 Mexico City 58.4	35 Kuwait City 64.8	35 Buenos Aires 71.2	36 Ho Chi Minh City 78.7
36 Istanbul 66.1	36 Beijing 58.1	=36 Rio de Janeiro 64.7	36 Santiago 71.0	<b>Average 77.0</b>
37 Moscow 65.8	37 Shanghai 57.4	=36 Sao Paulo 64.7	37 Kuala Lumpur 64.7	37 Mumbai 76.2
38 Kuwait City 64.5	38 Riyadh 56.5	=38 Kuala Lumpur 64.4	38 Mexico City 61.5	38 Riyadh 75.9
39 Riyadh 62.5	39 Kuwait City 56.4	=38 Santiago 64.4	39 Johannesburg 57.8	39 Moscow 75.3
40 Mexico City 61.6	40 Bangkok 56.2	40 Mexico City 64.1	40 Rio de Janeiro 57.7	40 Manila 74.7
41 Rio de Janeiro 60.9	41 Bogota 54.7	41 Baku 64.0	41 Sao Paulo 57.2	41 New Delhi 73.6
42 Sao Paulo 59.7	42 Quito 54.5	42 Riyadh 62.9	42 Kuwait City 56.4	42 Buenos Aires 72.9
43 Manila 59.2	43 Kuala Lumpur 54.4	43 Istanbul 61.7	43 Ho Chi Minh City 55.4	43 Jakarta 71.7
44 Johannesburg 58.6	44 Rio de Janeiro 52.7	44 Lima 60.7	44 Riyadh 54.8	44 Casablanca 69.5
=45 Lima 58.2	45 Manila 52.1	45 Bangkok 59.9	45 Bogota 53.9	45 Lima 69.3
=45 Mumbai 58.2	46 Baku 51.7	46 Quito 59.4	46 Manila 53.6	46 Rio de Janeiro 68.4
=47 Bangkok 57.6	=47 Mumbai 51.0	47 Bogota 59.1	47 Lima 53.0	47 Sao Paulo 67.5
=47 Ho Chi Minh City 57.6	=47 New Delhi 51.0	48 Manila 56.6	48 Bangkok 52.5	48 Istanbul 65.2
49 Baku 55.4	49 Lima 49.8	49 Ho Chi Minh City 56.3	49 Jakarta 52.3	49 Baku 63.7
50 Quito 55.3	50 Sao Paulo 49.4	50 Mumbai 55.8	50 Mumbai 50.0	50 Johannesburg 63.2
51 Bogota 55.1	51 Casablanca 44.9	51 New Delhi 54.6	51 Quito 49.9	51 Mexico City 62.3
52 New Delhi 55.0	52 Karachi 43.1	52 Johannesburg 53.2	52 Casablanca 49.6	52 Bangkok 61.8
53 Jakarta 54.5	53 Caracas 42.9	53 Jakarta 51.7	53 Cairo 48.2	53 Cairo 59.3
54 Casablanca 53.5	54 Moscow 42.8	54 Casablanca 50.0	54 Baku 46.3	54 Quito 57.5
55 Cairo 48.6	55 Jakarta 42.3	55 Caracas 48.1	55 Karachi 46.1	55 Dhaka 57.4
56 Dhaka 44.6	56 Lagos 42.2	56 Cairo 46.1	56 Yangon 45.3	56 Bogota 52.8
57 Karachi 43.5	57 Dhaka 41.9	57 Dhaka 45.1	57 New Delhi 40.7	57 Yangon 52.3
58 Yangon 41.9	58 Cairo 40.7	58 Yangon 42.3	58 Lagos 37.4	58 Karachi 45.9
59 Caracas 40.1	59 Ho Chi Minh City 40.2	59 Karachi 39.0	59 Dhaka 34.2	59 Caracas 42.1
60 Lagos 38.1	60 Yangon 27.8	60 Lagos 34.1	60 Caracas 27.3	60 Lagos 38.7

Four boxes across the following pages look more closely at the individual pillar results. The rest of the discussion in the main text focuses

on insights for cities from the overall picture—an area that has received less attention in previous SCI reports.

## Digital security



### The top five:

1. Tokyo
2. Singapore
3. Chicago
4. Washington, DC
- 5 = Los Angeles
- 5 = San Francisco

**What these leaders have in common:** all get full marks on every digital security input indicator. As a result, they have low levels of infection by computer viruses and malware.

**Where they differ:** the only thing that sets these cities apart is the percentage of residents with internet access, which ranges from 76% in Los Angeles and San Francisco to 91% in Tokyo.

**Of interest:** getting security right before expanding access seems to be the best approach. Kuwait City has the highest level of internet access (98%), but weaknesses in privacy policy, citizen awareness of cyber-security, and dedicated cyber-security teams help explain how between 20% and 30% of the city's computers are infected and its low score on the presence of malware.

## Health security



### The top five:

1. Osaka
2. Tokyo
3. Seoul
- 4 = Amsterdam
- 4 = Stockholm

**What these leaders have in common:** these leaders get the basics right, scoring well—including often getting full marks—for areas like healthcare access and quality, safe food, water and air, and speed of emergency services.

**Where they differ:** a key difference is the much higher number of beds per head in the Asian cities in this list compared with European ones. Given similarities in terms of healthcare access and quality, this may reflect differing medical cultures rather than a fundamental weakness in Amsterdam or Stockholm.

**Of interest:** healthcare outcomes reflect the disease burden as much as quality of health systems: four of these cities score around 70 out of 100 for cancer mortality, and Amsterdam does much worse. The top cities on this indicator, those from Arab states, benefit from fewer cases of cancer rather than a superior ability to deal with those that arise.



## Infrastructure security



### The top five:

1. Singapore
2. Osaka
3. Barcelona
4. Tokyo
5. Madrid

**What these leaders have in common:** Again, good policy is essential to become a leader in this pillar, with every one of the top five scoring full marks for their continuity management plans, pedestrian friendliness, institutional capacity and disaster-risk informed development.

**Where they differ:** Beyond first place Singapore, the other cities have a mixed record on the quality of their infrastructure. Although none do poorly—the worst is Osaka’s 22nd place for its air travel links—each of these four lags behind leading peers in at least one area.

**Of interest:** infrastructure is the area that sees the widest variations in scores—and therefore the greatest possibility for improvement. Singapore’s 96.9 points is the highest figure for any city in an individual pillar and Caracas’ 27.3 the lowest.

## Personal security



### The top five:

1. Singapore
2. Copenhagen
3. Hong Kong
4. Tokyo
5. Wellington

**What these leaders have in common:** They are strong on personal security inputs, with all scoring between 92 and 96 points out of 100. In particular, each gets full marks for the policing-related indicators: level of engagement, community-based patrolling and use of data-driven techniques.

**Where they differ:** those trying to reach the top of this pillar face different challenges. For Hong Kong and Tokyo, corruption and organised crime are still a problem, although they are typically better than in most other index cities. For Wellington, the most visible weakness in the index is illegal drug use, for which it comes 56th.

**Of interest:** citizens don’t look at policies but at results. The index’s perceptions of safety score correlates closely with levels of violent and petty crime, but shows no statistical link to input scores.



At this overall level, the 2019 leader, for the third time running, is Tokyo, with a broad array of strengths. It ties for first place on indicators as diverse as low crime levels (both violent and petty), infrastructure designed to withstand natural shocks, and low risk of computer malware. Meanwhile, its lowest pillar score is still a very respectable fourth place (for both

infrastructure and personal safety). Mr Tomer is not unusual in noting that “by many accounts, Tokyo is one of the world’s best run cities.” Governor Koike, adds that safety has been a long-term, leading focus of the metropolitan government for many years, and that Tokyo has not finished its innovation in this area (see box).







## Q&A with a city leader—Yuriko Koike, governor, Tokyo



*The Economist Intelligence Unit: Tokyo has come first in The Economist Intelligence Unit's Safe Cities Index in 2015, 2017 and now again in 2019. Why do you think Tokyo has been so successful?*

**Governor Koike:** Given that earthquakes are endemic to Japan and we are also witnessing major climate change around the world, it is utterly critical that Tokyo protects residents and the city from natural disasters. To do so, we have pursued a range of reforms, both on the infrastructure and the intangible side, expending a large budget. Tokyo's having received high acclaim as a safe city results in part from the steady and consistent way we have pushed forward these initiatives over the years.

*The Economist Intelligence Unit: Where are some of the city's largest current efforts around safety and resilience?*

**Governor Koike:** Last year, we had heavy rains. Flooding and water damage caused many incidents involving landslides and the loss of human lives in Japan. Tokyo is surrounded by several rivers, so there are also infrastructural concerns to consider in such situations.

We therefore created a vast underground reservoir. It is quite a cost-intensive project, but if you take into account the much greater cost of flood damage—including loss of life and assets—as well as the need to rebuild thereafter, taking preventive measures is ultimately more cost-effective.

Another issue is the profusion of utility poles around Tokyo. We are moving forward to bury these. The tangle of cables is not attractive, and they can topple in earthquakes, impeding rescue vehicles. As for infrastructure including buried objects like old water pipes, we have to take various measures to replace them or shore them up.

*The Economist Intelligence Unit: Recent research indicates that social connections and voluntary action play a major role in enhancing the safety of a city. What is Tokyo doing to respond to this insight?*

One idea is that of “self-help, mutual help and public assistance.” The hope is that residents should take the initiative to help themselves when needed. And they should then work together to help others. The administration should be there to provide backup.

In terms of self-help, we are promoting the use of rescue kits that residents can have on hand for emergencies, including spare water, rations, portable toilet equipment and the like for use in flooding, earthquakes, or other disasters. Mutual help refers to local residents practicing and training together and considering how to provide relief for, and by themselves in the event of an earthquake. Public assistance is what we in the administration do, as discussed earlier, such as projects to reduce the impact of flooding, and to educate the public on disaster prevention.

We recently developed something called *Tokyo My Timeline*. This functions as a kit and contains equipment to prepare for a flood. This presents a timeline of response efforts to review: when flooding or sudden heavy rains occur, what to do, in what order. Children use stickers in this handbook to learn, as though playing a game, what the right response is. This kit is designed to help residents learn independently how a proper response should be carried out. Teaching this in schools is effective, because the children go home and share what they learned with their family, which helps disseminate the information further. This is just one of several booklets we are distributing to help people know what to do in the event of a disaster.

This is just one of several booklets we are distributing to help people know what to do in the event of a disaster.

Beyond disaster response, each region in Tokyo has spent many years developing fire departments both at the administrative level, through the Fire and Disaster Management Agency, and through volunteer firefighters' groups. This allows local residents to be aware of the location of the sources of water and practice to a high degree of precision using hoses to draw water in the event of a fire. Sometimes they have local contests to further refine their skills, with the volunteer groups and agency working together to greatly increase local safety.



Along with Tokyo, other Asia-Pacific cities, as in the past, dominate. Singapore and Osaka come second and third, while Sydney and Melbourne also make the top ten. Although Hong Kong has dropped out of this group since 2017, Seoul has joined it, coming tied for eighth. Rounding out the leaders are two from Europe, Amsterdam and Copenhagen, and two from North America, Toronto and Washington, DC.

It would be wrong, though, to argue from these results that geography, or accompanying cultural differences, have a clear effect on urban safety outcomes. After controlling for other factors that strongly correlate with our overall and pillar results, which are discussed below, a city's region did not have any statistically significant relationship with SCl2019 performance. Tokyo, Singapore and Osaka are not safer because they happen to be in Asia, but because of the specific urban environments their residents and officials have built.

## Safety is indivisible

Going beyond the winners and losers in the index tables, a wider look at the results yield several key insights for policymakers and urban stakeholders. These begin with the nature of city safety itself.

As discussed above, different kinds of safety are relevant even when walking down the street. At first sight, the most obvious thing about these different kinds of security is that they rely on different providers: someone

might call the police for a personal security issue, say, but a doctor for health security.

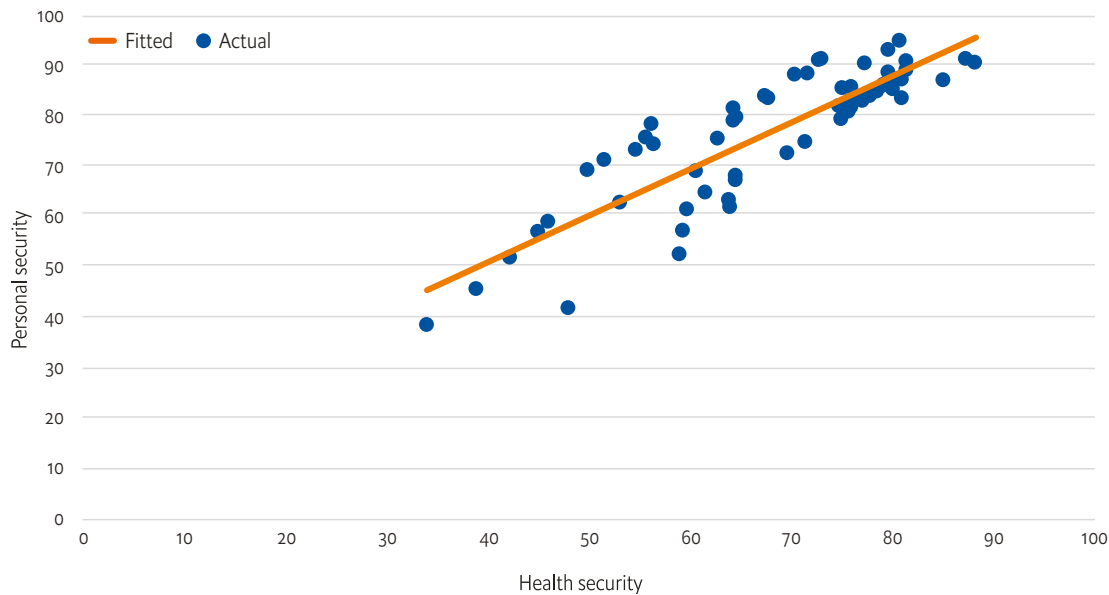
The scores in the four index pillars, though, turn out to be closely correlated. Just how intertwined different kinds of security are is "definitely not commonly or widely understood" among the public or policymakers notes Ms Johnston.

A look at the overall standings shows that the ranking of any given city in a particular pillar tends not to vary greatly from its ranking in other pillars. In other words, cities tend to be similarly good, mediocre or poor across all aspects of safety rather than leaders in one area and laggards in another. The accompanying graph, comparing the overall scores for personal and health security, shows just how closely these are related, suggesting that we simply go to the police for one and the doctor for the other is too simplistic.

This statistical link is no accident. In London, for example, the UK's Mental Health Crisis Care Concordat results, among other things, in police working with other appropriate agencies to get the best care for individuals experiencing a mental health crisis, who might previously simply have been arrested if they had threatened the safety of others. However, Lord Bernard Hogan-Howe, recently retired as commissioner of London's Metropolitan Police, explains that one reason for fewer deaths from violence or accidents in many cities, quite apart from improvements in policing or other services, is better emergency healthcare.



**Figure 4: Health security versus personal security**  
(Weighted sum of underlying sub-category scores)



The personal-health safety link is the rule, not the exception. Infrastructure scores also correlate closely with those of other pillars. This is a connection that Mr Tomer notes “is pretty typical that folks miss”, except in obvious cases of massive infrastructure failure. Fumihiko Nakamura, vice-president of Yokohama National University in Japan, points out that urban infrastructure shapes lifestyles, including things as basic as whether one walks or drives to work. As a result, “infrastructure either propels, or detracts from, one’s health”, and therefore the health security of many citizens. Similarly, note several interviewees, the design of public places can have a

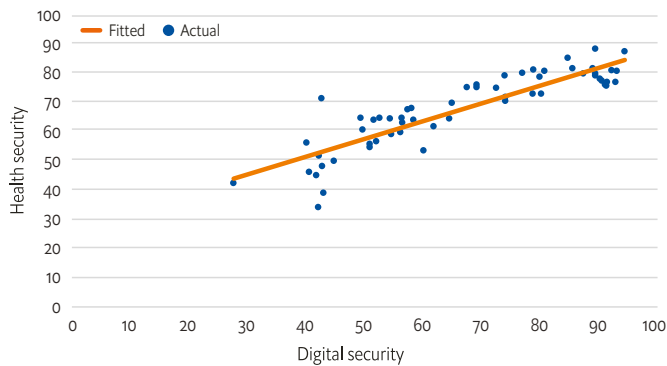
substantial impact on the personal safety of those using them.

Perhaps the most underappreciated—and therefore particularly noteworthy—connection is that between digital security and other fields. Gregory Falco, cyber research fellow at Stanford University, observes that “digital and physical security are very closely entwined. Nevertheless, it is hard for citizens and governments to align the two things.”

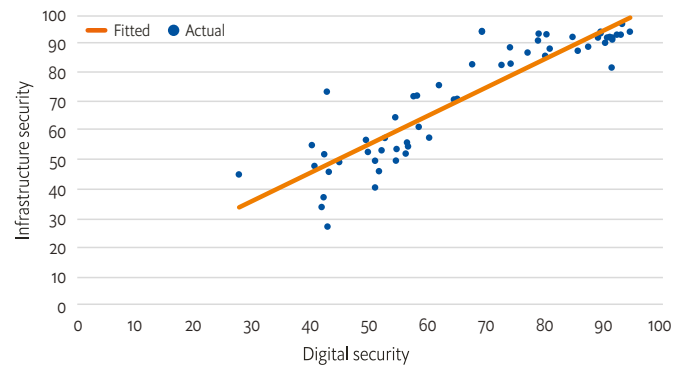
The index data make the connection abundantly clear. As the three charts show, our digital security scores correlate closely with those of the other pillars.

**Figure 5: Safety is indivisible****Digital security versus health security**

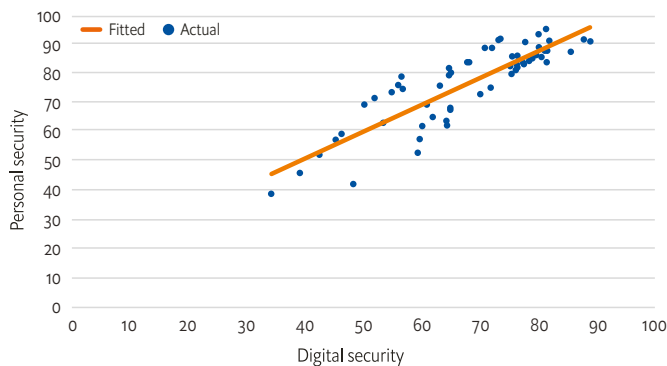
(Weighted sum of underlying sub-category scores)

**Digital security versus infrastructure security**

(Weighted sum of underlying sub-category scores)

**Digital security versus personal security**

(Weighted sum of underlying sub-category scores)



Correlation does not prove causation, and the relationship between different kinds of security goes both ways. Nevertheless, part of the connection is a frequent reliance of other pillars on digital security. Mr Falco notes that the operational technologies behind much of the “urban critical infrastructure that makes life function are vulnerable to attack, which would carry immense economic and physical consequences.” The health pillar is equally reliant, as the WannaCry ransomware attack on

the UK’s National Health Service made all too obvious, leading to the cancellation of 19,000 medical appointments from May 12th to 19th, 2017.<sup>9</sup>

Mr Lam puts the importance of digital security succinctly: “Everybody depends on data to do business, so you have to make sure every business continuity plan involves a plan for IT systems to handle a disaster. Our cyber-security drills are related not just to digital

<sup>9</sup> UK Department of Health and Social Care, *Securing cyber resilience in health and care: Progress Report*, October 2018.



## New technology and non-digital security



Technology plays an obvious role in digital security, but new developments in artificial intelligence (AI) and robotics are opening some intriguing new possibilities in other pillars.

In healthcare, technological advances occur all the time, but one of the most exciting fields currently is the application of AI to data in order to improve public health. This can enhance health security in ways not previously possible and restricted only by the imagination. At the national level, for example, the use of rainfall forecasts, population density data and other relevant information has helped aid agencies to predict cholera outbreaks in Yemen with over 90% accuracy, allowing them to engage in prevention and pre-position supplies.<sup>10</sup> At the urban level, Las Vegas uses AI to analyse Twitter posts in order to greatly improve the effectiveness of its restaurant health inspections.<sup>11</sup>

Adie Tomer, who leads the Metropolitan Infrastructure Initiative at the Brookings Institution, sees the use of smart technology as a way to improve infrastructure capacity and safety as well. “These days, the easiest wins come from focusing on operational improvements, ideally through new data inputs.” He cites automating water pipe maintenance as a much less expensive way to improve capacity and reliability than building out new capacity. Similarly, smart transportation solutions have great potential to improve the

use of existing roads: in Moscow, the adoption of intelligent traffic and parking management reduced congestion by over 20%, despite an increase in car ownership.<sup>12</sup>

Personal security is also seeing innovation. One of the more intriguing is Dubai’s new robot police officers. These will patrol malls and tourist locations. In many ways they have the kind of capacity that would already be available on a mobile phone app, such as the ability to get safety information, report crimes, speak directly with human police through voice communication and pay fines. However, not everyone, especially tourists, is likely to have downloaded such an app, making the placement of these robots in public places valuable. Moreover, these police robots will also be collecting information—on traffic congestion in the first instance. Although likely to be expensive in the initial development stage, these new officers may prove to be cost effective. Dubai hopes that they will allow the reassignment of existing human police to areas where the latter’s efforts would be more valuable.<sup>13</sup>

The robots, though, point to an important issue of technology deployment. Robocops have the potential to be used for repression as well as true citizen safety. These AI engines and robots can be very valuable tools to enhance urban security. It will depend on how humans deploy them.

<sup>10</sup> “How Met Office weather data is being used to predict cholera outbreaks,” *Daily Telegraph*, 29 August 2018

<sup>11</sup> Adam Sadilek, “Deploying nEmesis: Preventing Foodborne Illness by Data Mining Social Media,” *AI Magazine*, March 2017.

<sup>12</sup> McKinsey, “Building smart transport in Moscow,” *Voices on Infrastructure*, 2017; “Moscow,” *Tom-tom Traffic Congestion Index*, [https://www.tomtom.com/en\\_gb/trafficindex/city/moscow](https://www.tomtom.com/en_gb/trafficindex/city/moscow), accessed 25 May 2019.

<sup>13</sup> “Robot police officer goes on duty in Dubai,” *BBC News*, 24 May 2017.





security but to business continuity and disaster preparedness. These are all interrelated.” Governor Koike agrees: “cyber-security encompasses everything from corporations, to power plants, to even outer space.” Accordingly, it requires extensive stakeholder co-operation.

Technology, though, is not only a potential vulnerability. Digital security can be a selling point. Ms Johnston explains that the Municipality of Rotterdam has invested heavily in cyber-security not only for its own benefits but so that its port—Europe’s busiest, with all the infrastructure that entails—remains a safe place to do business. Looking further, the linkage between digital security and other kinds reflects the important role that technology itself can play in every index pillar (see box).

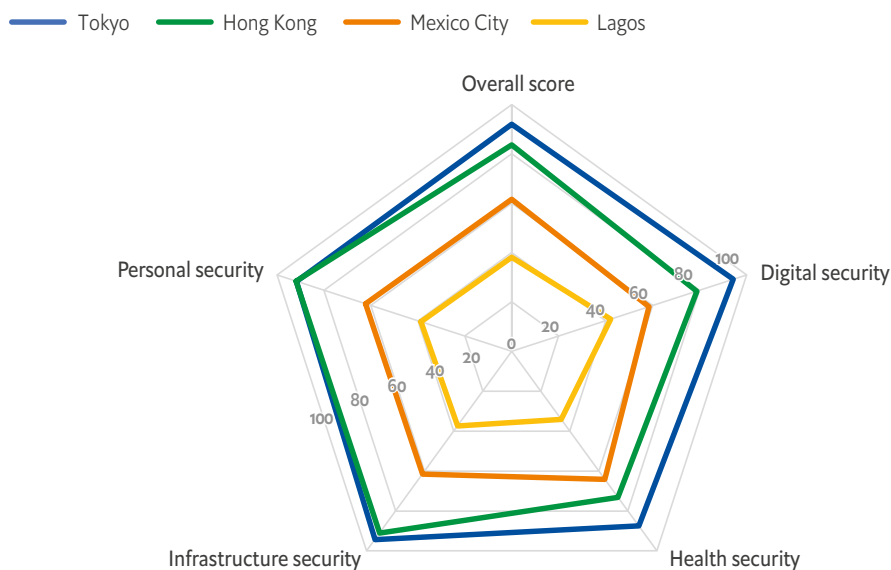
The message from the data is not that digital security, or indeed technology, is the silver

bullet for urban safety. Instead, the index results indicate that a safe city is one where efforts by citizens, stakeholder groups and authorities in a wide range of fields to reduce and protect against various kinds of risks mutually re-enforce to create a generally secure environment. “Security is indivisible” is a truism in international relations. It applies equally to urban safety.

### What sets cities apart?

A striking feature of the overall survey results, and those within pillars, is the clustering of results near the top. The accompanying spider chart, which maps the results of the cities in first, 20th, 40th and last place overall, shows the relatively small point differences between the top cities and the larger ones among those finishing lower down.

**Figure 6: City comparison overview**





This suggests that the differences between cities near the top, however important, are much smaller compared with those further down the table. A closer analysis of the SCI2019 results indicates two key factors associated with urban safety that explain this clustering.

The overall scores correlate very closely, and independently, with income and transparency. The accompanying chart shows the correlation between the best fitting formula using both variables compared with the real overall scores. In other words, cities that have achieved a certain standard of development and governance tend—whatever their distinct strengths and weaknesses—to achieve a high basic level of security. Those that are less developed or have weaker governance struggle to reach this underlying degree of safety that set apart this cluster of leaders.

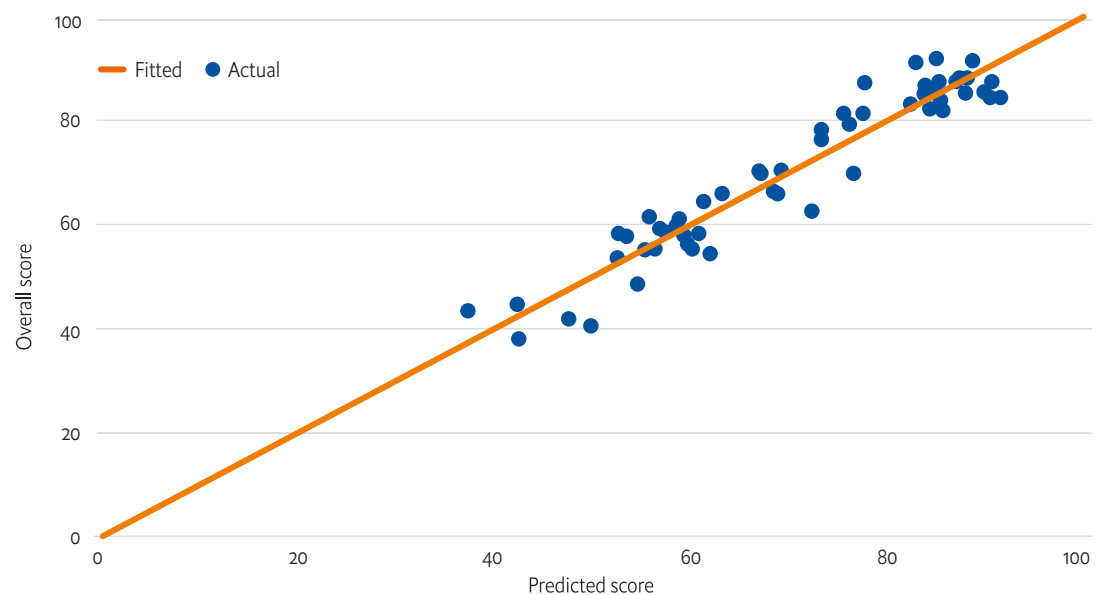
## i. Wealth matters, but sometimes in unexpected ways

Every previous SCI report has remarked that cities in high-income countries do better on average than those in lower-income states. In earlier years, apparent anomalies existed: some cities in upper-middle-income countries did better than certain others in high-income countries. More localised data, however, eliminate the apparent problem, because the high-performing cities in middle-income countries have markedly higher per-head income than their national figures. Across the board, overall SCI results correlate extremely closely with income per person in cities.<sup>14</sup>

One obvious explanation is that certain elements of safety benefit from investment.

**Figure 7: Differences narrow near the top**

Predicted score from city HDI and corruption control joint correlation versus overall score



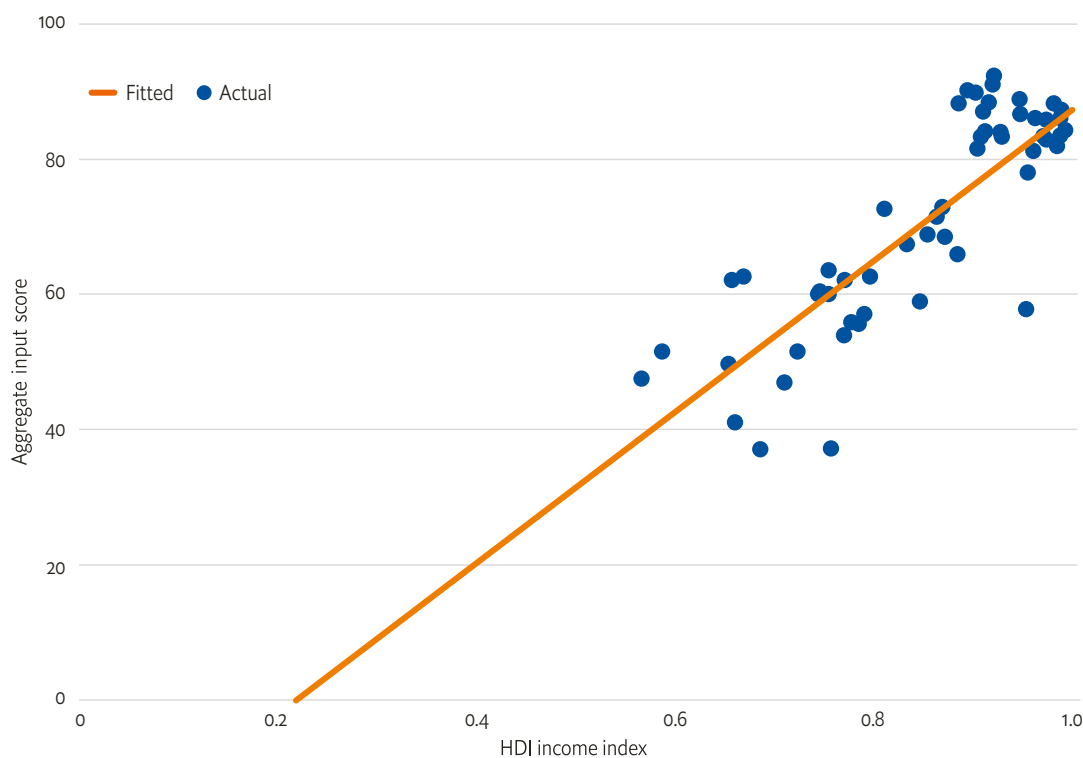
<sup>14</sup> City income figures are based on Income Index figures reported for the relevant cities or their regions in the Radboud University Institute for Management Research, "Subnational Human Development Index," 2019 and, for Singapore, the Income Index figure reported in UNDP's *Human Development Reports*, "Singapore Profile," 2018.



Lord Hogan-Howe notes, for example, that “you compromise on the cost of policing to your danger. There is a level of investment you have to make for a quality product.” He elaborates that poorly paid officers face a greater incentive to become corrupt, thereby undermining the entire justice system. Similar links exist in infrastructure, Mr Tomer explains, many “capital investments are really expensive. It is asking a lot to, say, just build a new train line.” Indeed, robust budgets are an important element of success in various SCI indicators, such as doctors and hospital beds per head, or the use of data analytics to fight physical and cyber-crime.

The availability of resources for safety, however, is only part of the story. A problem of at least equal importance that our index data reveal is that, where money is scarcer, so too is policy ambition. City income per head correlates very closely with the SCI aggregate index input scores, which largely measure policy and effort. This might be understandable if less economically developed cities spent less on the most expensive inputs. However, removing the higher-cost ones mentioned above does not affect the correlation. Those cities with less money are not always spending some of what they can afford in the field of security.

**Figure 8: Three close companions: wealth, transparency and safety**  
HDI income index versus aggregate input score





Such results do not surprise Mr Badiane. Speaking of Africa's large cities, he says that the main driver of insecurity is the extent of informal settlements. This arises not from a growing population per se, he adds, but poor or insufficient planning. "It is not acceptable. We have a lot to do, but the number one priority is improved urban planning and better city management."

Nor do public policy initiatives that enhance safety need to be expensive. Potential easy wins exist in each SCI pillar. Regarding digital security, Mr Falco says that the "most basic steps don't require capital but education and time to create a cyber-security culture." This involves things as straightforward as locking your computer when you leave the room and not clicking on links from people you don't recognise. In health, adds Mr Bollyky, along with challenges in developing country cities, possible advantages also exist. In much of Africa, for example, smoking is low by global standards, while South-east Asia and India still enjoy low obesity rates, at least relative to Western nations. "To the extent you can encourage healthier behaviours early, you might still be able to head off some of the worrisome outcomes that we see in non-communicable diseases in developed countries," Mr Bollyky says.

Certain low-cost infrastructure adjustments can also enhance safety. Mr Ijjaz-Vasquez reports that in some places "painting lines on a street does not cost a lot" but can reduce accidents markedly, while making sure that the police and ambulance use the same terminology to describe accidents, which is not the case everywhere, can make the response far more effective. As for enhancing personal

security, many interviewees mention that simply making sure public places are well-lit and designed can work. Ms Johnston notes that "the cost of some of the most effective urban rehabilitation interventions that lead to better security are limited," and especially cost-effective when done to address the specific practical needs of local residents.

Each one of these might seem small but, as Mr Falco puts it, "enough quick wins will add up." Economic growth can help developing world cities close the safety gap with wealthier ones, but, first, many of the former must decide to engage with the relevant issues more energetically and creatively in the many places where they can.

## ii. Transparency matters at least as much as money

The level of city government transparency—measured using the World Bank's national Control of Corruption figures as a proxy—correlates about as closely with the SCI scores as does income per head.

Mr Badiane argues that transparency and accountability matter more than income. He recalls that when, 20 years ago, he helped initiate a safer cities programme at UN-Habitat, "we started by designing it as a poverty programme. We then realised that we were on the wrong track. Security is a governance issue."

As with wealth, some of the ways that transparency, accountability and good governance improve safety are obvious. Mr Tomer notes that, given the cost of major infrastructure, "almost all over the world, the potential for bribes is high. If you don't have good governance, it is a perfect area to be



corrupt.” The resultant corner cutting can prove all too dangerous.

Other ways that safety and transparency interact are less intuitive but equally important. Dr Agarwal says that “good governance is more crucial than aggregate wealth for improving the equitable reach of any public goods and services such as health and health security.” A recent *Lancet* study shows the extraordinary effect that this can have. It found that the length of time a country had been a democracy and the quality of its democratic experience have a profound effect on certain aspects of health. On average, a transition to democracy from some other form of rule improves HIV-free life expectancy by three years in the subsequent decade compared with no political change.<sup>15</sup> Mr Bollyky, the lead author, explains that the experience of democracy, presumably through the long-term accountability it brings, “ends up mattering more than does GDP for success against certain [health challenges] such as cardiovascular disease, cancer, car accidents and tuberculosis.”

In the area of public order, transparency and accountability also turn out to be a boon. Lord Hogan-Howe notes that, over his 40-year career, simple steps like installing closed-circuit television cameras in police stations and recording interviews with suspects have raised the quality of police work substantially, meaning that the public are better served. “If you improve accountability in a way that demonstrates integrity, that has a profound effect” on community trust and therefore

the ability of the police to protect citizens, he adds. Ms Johnston agrees: “When police focus on accountability, you see higher levels of citizens reporting crime as well as supporting and facilitating police work. There is a direct correlation between being more transparent and higher levels of security itself.”

Beyond specific examples, notes Mr Ijjaz-Vasquez, “good transparency means more access to information. The more citizens understand the dangers they are facing, the more they can make more appropriate decisions at the household level, and make sure the matter is a priority at the next election.”

Indeed, the information need not even come from the governments of the cities involved, so long as it is accessible. Mr Bollyky points to the US Embassy in Beijing simply measuring and publishing previously unrecorded air pollution levels as an important impetus to improvements there. Individuals can also play a role in expanding transparency. The mobile phone app Saftipin crowdsources what it calls “safety audits” from female users, which score a particular location on lighting, openness, visibility, crowd, security, overall feel and several other metrics. It then aggregates these and combines them with other data to recommend the safest routes between any two points within the city. In New Delhi, Saftipin’s first city, authorities also used the data to light over 7,000 identified “dark spots”, and police adjusted their patrolling to spend more time in areas that were perceived as dangerous.

<sup>15</sup> Thomas Bollyky et al., “The relationships between democratic experience, adult health, and cause-specific mortality in 170 countries between 1980 and 2016: an observational analysis,” *Lancet*, 2019.





## A look at SCI trends: Urban safety is a marathon, not a sprint

In specific circumstances, such as war, civil unrest or natural disasters, which undermine public order and destroy infrastructure, city safety can decline rapidly. The SCI data, however, indicate that it is much more common for change to take time in the field of urban safety. Direct comparisons of scores between the 2017 and 2019 indexes are impossible given the changes this year (see box on Washington, DC). However, an in-house analysis that compared what was the same between the two years found little change in the reported results. Moreover, many shifts came from finding improved information sources rather than observable change in the cities themselves. This does not mean improvements did not occur, simply that the shifts were few and often small, or at least hard to detect.

This comes as no surprise to experts consulted for this study. As Mr Leon puts it, “building a city is a permanent thing. Improvements can take a long time.” The brakes on speed differ with different kinds of security. They are most obvious in infrastructure. This, Mr Tomer explains, “operates on time lines that are longer than typical human ones. If you are in London, for example, as you go closer to the Roman core, the right of way was laid out 2,000 years ago.” Similarly, the water system relies on tunnels dating to the 19th century. For better health security, meanwhile, says Mr Bollyky, “building out improved primary or preventative care in developing world cities can be done a

lot faster than a citywide sewer system, but still can’t be done overnight.”

Improving personal security also involves some longer-term challenges, such as building and maintaining trust with city residents. This can take time but is essential. Lord Hogan-Howe notes that “most crimes are still solved by someone [in the community] telling the police who did it.” Similarly, notes Mr Lam, the stakeholder co-operation needed for better digital security relies on building trust. “Without it,” he warns, “you will not be successful.”

Of course, some quick wins are possible. Mr Ijjaz-Vasquez says that “things like improving the lighting, cleanliness and security presence in parts of a city can change situations in a matter of weeks or months, as can cleaning drainage facilities. Stopping informal settlements in high-risk areas can take months to years,” and greatly reduce the risks from natural disasters.

Even doing this much, though, requires that “cities think security is an important topic,” Mr Ijjaz-Vasquez adds, not just in the abstract but as part of the ongoing political agenda. Maintaining this focus through subsequent electoral cycles and amid the claims of myriad political issues is the fundamental challenge and the key to progress in both the short and long term. What Dr Agarwal says of healthcare and infrastructure applies across most aspects of security: “Systems need to be invested in so that they steadily reach the most vulnerable and needy parts and populations of the city. It takes perseverance.”



## A look at what has, or has not, changed in Washington, DC

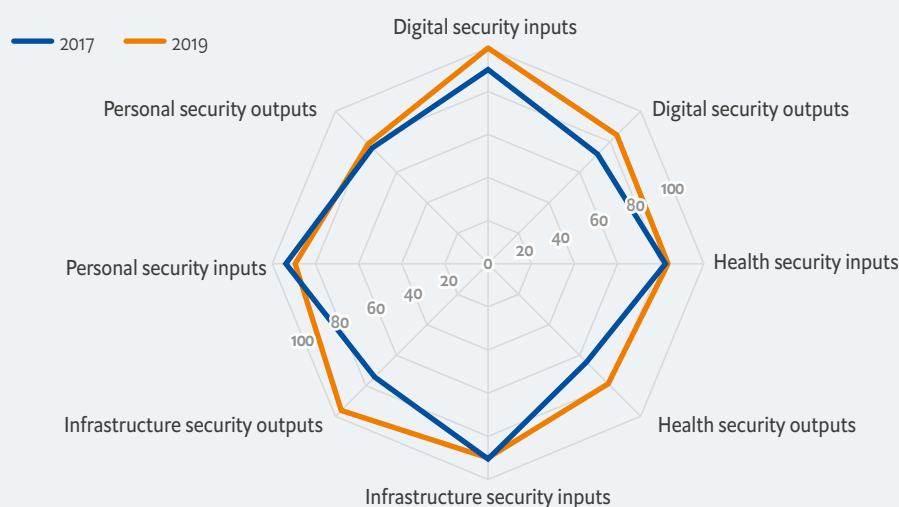


Reports that track data across the years will, from time to time, warn that methodological changes make comparisons with previous data invalid. This is the case for Safe Cities Index 2019 (SCI2019). A close look at one example, Washington, DC, helps show why.

At first, there appears to be signs of clear progress.

- In 2017 the index looked at the number of vehicle accidents per million inhabitants. A review, however, found that the data available from different cities was not mutually comparable. Accordingly, in 2019 we switched to road traffic deaths, for which more robust information were available.

**Figure 9: Washington, DC, pillar input and output scores**



The city went from 80.4 points overall in 2017 to 87.6 in 2019, explaining its rise from 23rd to 7th place among index cities. A comparison seems to indicate visible gains, especially on pillar outputs.

Has the US capital become safer? Our data cannot answer that for two reasons. First, we are measuring some things in a new way, making improvements on the previous methodology. The most relevant cases of this are as follows:

- The source used for identity theft figures from 2017 itself warned this year that those from the US were—because of that country's more stringent reporting requirements—almost certainly unsafe to compare with those in other countries. SCI2019 therefore replaced this indicator with one measuring exposure to malware.



- Finally, in 2019 the SCI shifted from crude rates of cancer death to ones standardised to remove the impact of differences in population age. These are generally considered the best metric for international comparisons.

Washington, DC, scored substantially higher on these better metrics: a relatively low number of road traffic deaths yielded a 92.2 score, compared with 0 last year because of a large number of reported accidents; its 100 points in the malware metric was noticeably higher than its 85.5 for identity theft; and its 53 for age-standardised cancer mortality, while only a mid-range score, was much better than the 0 it got in 2017 for its crude rate.

The addition of new, resilience-related indicators also helped the city's overall score. It earned 100 points for each of: emergency services in the city; air transport facilities; institutional capacity and access to resources; catastrophe insurance; disaster-risk informed development; cyber-security preparedness; and hazard monitoring.

Finally, use of better data sources available in 2017, which our researchers did not find until this year, led to big gains in the scores for the number of hospital beds per head, public-private

partnerships for cyber-security, and the rate of illegal drug use.

Two further factors impede calculation of a precise numerical impact for these changes. First, indicator weightings used to aggregate scores have changed. Second, because so many scores reflect the relative performance of urban areas, the replacement of four 2017 cities with new ones can have an impact: Lagos' low life expectancy, for example, changes the scale of that metric, driving up the points given to other cities, even if their life expectancy had not changed.

That said, adjusting the weighting of the scores in each year's index to remove all new indicators and those that saw substantial change gives some idea of the underlying shift in the security performance of Washington, DC. The resultant overall scores for 2017 and 2019 are less than two-thirds of a point apart.

This does not mean that nothing has changed in the city—only that the shifts that we have measured consistently are slight. Washington, DC, does better in SCI2019 than in the past because our measures and methodology give a better understanding of its strengths and weaknesses.

## Q&A with a city leader—Victor Lam, government chief information officer, Hong Kong



*The Economist Intelligence Unit: Unlike some other fields of urban security, digital risks can come from anywhere. How should a city deal with the international nature of the threat to digital security and what practical challenges does it bring?*

**Victor Lam:** In Hong Kong, because we are quite an open city, digital security threats come from everywhere around the world. We have to put in place multiple kinds of security measures so that we are better protected. We have accordingly adopted a very transparent approach. We network with various operators in the city and last year created a cross-sector information sharing platform—Cybersechub.hk—to share intelligence. Cities with fewer resources can also do similar things. Information sharing need not entail a large amount of resources and should be done everywhere in the world.

We also put a heavy emphasis on raising awareness. The WannaCry attack is a good example. When it broke out, many cities encountered big problems. When we came across the news of what was happening in other cities—I remember it was a Saturday morning—we immediately communicated the information to our partners including the Hong Kong Computer Emergency Response Team (HKCERT) and the police force. This helped raised public understanding.

We also issued a press statement, then a public forum was held on the Sunday and, on Monday, I took part in a press conference and conducted

several telephone interviews. Throughout, we raised public awareness and published a lot of alerts to government departments to ensure they had taken appropriate measures. HKCERT also offered a hotline for the public and small businesses. Although WannaCry had a major effect elsewhere, Hong Kong was quite well protected.

*The Economist Intelligence Unit: How do you expect the threats to digital security to evolve over the next few years?*

**Victor Lam:** The Internet of Things (IoT) will bring big changes. At the moment, organisations more or less focus on end-point security, but with so many IoT devices the vulnerability will be extensive. We have to ensure that we put enough emphasis on their protection, especially IoT devices used for infrastructure. We increased our emphasis on IoT security recently and have asked HKCERT to step up research into, and encouragement of, best practice measures.

*The Economist Intelligence Unit: Although we look at different domains of security separately in the Safe Cities Index, what do you see as the key links between digital security and other areas?*

**Victor Lam:** I fully agree that they are closely related. Critical infrastructure security also includes digital security. The importance of this link will increase now that we are talking about smart cities because in a smart city there will be much more digitised critical infrastructure. For example,



in Hong Kong we are installing smart lampposts with numerous smart devices in place. If we do not implement digital security protection in them from the start, beginning with the design stage, it could lead to substantial problems.

*The Economist Intelligence Unit: What are some of the new initiatives that Hong Kong is engaged in to improve digital security?*

**Victor Lam:** There are several aimed at making the right interventions in the right places. To begin with, for the public, a government initiative will provide electronic ID free of charge starting from [the] middle of next year, as a way to establish more trust through secure identification.

Financial support is important so that smaller organisations will be more willing to step up. We have doubled the matching funds under the Technology Voucher Programme to HK\$400,000 to help them upgrade systems. These upgrades can include better security.

Finally, for those with .hk domain registrations, we are engaging the Hong Kong Internet Registration Corporation, which manages that domain name. It will now provide those using it with free technical support on how to reduce vulnerability. Here, it is a case of not doing it ourselves, but engaging the right party to provide the right advice.







## The SCI cities and resilience

The SCI2019 includes new indicators specifically related to resilience. These, when combined with relevant indicators carried forward from previous versions of the index, paint a clear picture of how well index cities are doing in this field.

### The challenge in aggregate

Resilience is about avoiding, mitigating or responding to potential shocks. By definition, the events—including natural events or technological accidents of disastrous proportions, as well as man-made violence from terrorism or war—are fortunately rare. Otherwise, they would become part of normal life and urban residents would adjust. For example, except in extreme years, Venetians have personal, neighbourhood and municipal mechanisms to cope with their city's regular periods of *acqua alta* in winter; in most other urban areas, knee-deep water in the main square and central streets would be a disastrous flood.

In recent years, the aggregate toll of shocks on SCI cities has been much less than the attention that such events receive. According to data gathered for the index, on average across the 60 cities during the last five years natural disasters have killed about 1.7 people per million population annually. That is roughly a tenth the rate of female homicide in these cities. The loss to terrorism is even lower. The total number of deaths and injuries per year over the past decade in all the SCI cities combined is around 1,000—about half the number killed annually in pedestrian accidents in Cairo alone. This is not to minimise the pain felt by those who lose loved ones to natural

and man-made disasters, but simply to put the numbers into perspective with the other challenges facing cities.

Developing resilience against such shocks despite their relatively low toll is essential for several reasons. First, as Lord Hogan-Howe notes about terrorism, it is “rare. Each death in a terrorist attack is a tragedy. However, many more people are the victim of homicide each year and around twice as many again die on the roads. Terrorism is terrifying because it is intended to be terrifying. People need to be reassured. It falls into a category of risks that cannot just be measured by the volume of events.” He adds that, because of media coverage, terrorism in any given city is likely to be disconcerting to residents of other locations. Similarly, although lacking the political intent, news of tsunamis, earthquakes and floods elsewhere remind those in other cities on coasts, near fault lines or in low lying areas of their vulnerability.

Second, although these are low-frequency events, they are potentially very high impact. For example, Mexico City has had fewer people per head die from natural disasters than the SCI average over the past decade—resulting in its 92-point score on that indicator. During the past century, though, it has suffered from major earthquakes (over 7.0 on the Richter scale) roughly once every 30 years. These can be devastating: estimates for the number killed in 1985 typically range from 10,000 to 40,000. In such circumstances, a rapid, coherent response can make all the difference.

Finally, concern is growing that the frequency of adverse events will rise. In Mr Van Begin's





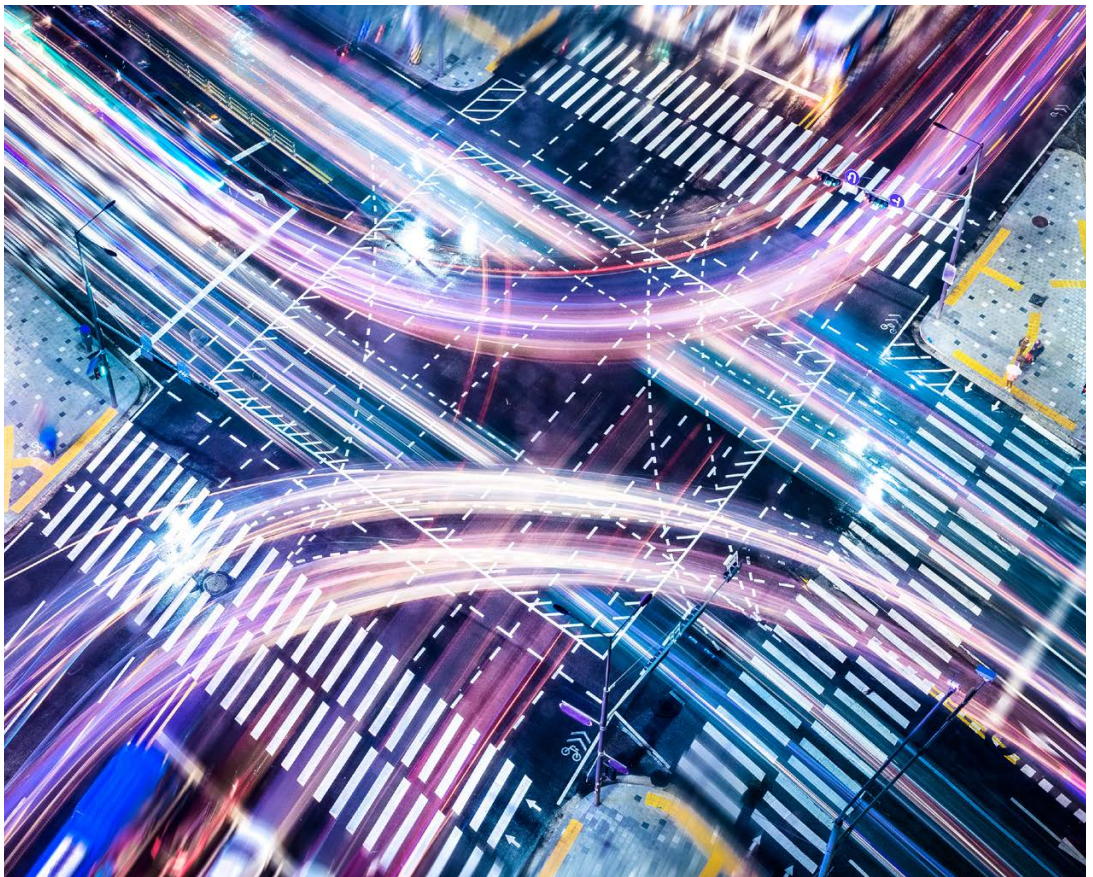
experience, “the impact of climate change has become a huge driver for policymakers at the urban level to act.” Mr Ijjaz-Vasquez agrees: “The frequency and intensity of natural disasters is moving to the fronts of minds of citizens and local administrations. Cities are getting more serious.”

The problem is deciding on what to prepare for. Mr Ijjaz-Vasquez continues, “We know certain things about climate change, but once you move to the city level, uncertainty begins to be very large. If you are preparing infrastructure for the next 50 years, you know it may be bad, but you don’t know how bad.” This is why

resilience emphasises the need for having flexible assets available to address shocks and plans to deal with them. As Mr Badiane puts it, “Disasters: you cannot control them. The only thing you can do is be ready.”

### **Risk and readiness in the SCI: Wealth and transparency redux**

The SCI does not have a specific resilience score. Here, though, we recombine relevant individual indicators into three useful categories described in detail in a previous section: damage and threat multipliers; relevant assets; and preparation.



Damage and threat multipliers		Relevant assets		Preparation	
Copenhagen	98.6	Singapore	100.0	Washington, DC	99.5
Singapore	97.5	Tokyo	98.1	Amsterdam	99.2
Amsterdam	96.7	Chicago	95.6	Brussels	99.2
Osaka	96.4	Los Angeles	95.6	Singapore	99.2
Stockholm	96.0	New York	95.6	Los Angeles	98.9
Tokyo	94.6	Washington, DC	95.6	New York	98.9
Frankfurt	94.5	Hong Kong	93.0	Tokyo	98.9
Hong Kong	94.4	Taipei	92.7	Toronto	98.9
Zurich	94.2	San Francisco	92.6	Seoul	98.7
Chicago	94.1	Melbourne	92.4	Chicago	98.4
San Francisco	94.1	Osaka	92.4	Dallas	98.4
Dallas	93.7	Sydney	92.4	Osaka	98.4
Toronto	93.6	Toronto	92.4	San Francisco	98.4
Melbourne	92.9	Dallas	92.0	Melbourne	97.9
Sydney	92.9	Amsterdam	90.2	Sydney	97.9
Taipei	89.7	Paris	90.2	Wellington	97.9
Seoul	89.5	Seoul	89.9	Barcelona	97.4
Kuala Lumpur	88.9	London	88.8	Madrid	97.4
Madrid	88.9	Abu Dhabi	88.7	Frankfurt	94.8
Milan	87.8	Dubai	88.7	Hong Kong	84.9
Abu Dhabi	86.9	Stockholm	87.4	Copenhagen	84.1
Barcelona	86.9	Copenhagen	87.3	London	83.3
Dubai	86.9	Wellington	86.5	Taipei	81.3
London	86.9	Zurich	85.2	Paris	77.8
Kuwait City	86.7	Frankfurt	83.3	Stockholm	76.5
Buenos Aires	86.4	Brussels	82.6	Zurich	76.5
Washington, DC	86.4	Barcelona	81.6	Beijing	75.7
Los Angeles	85.7	Madrid	81.6	Shanghai	75.7
Santiago	85.3	Milan	76.7	Buenos Aires	69.8
Rome	85.1	Beijing	74.9	Milan	69.0
Beijing	84.8	Shanghai	74.9	Rome	68.8
Johannesburg	84.8	Rome	72.9	Abu Dhabi	67.7
Wellington	84.6	Santiago	70.2	Moscow	66.9
Brussels	84.2	Kuwait City	69.0	Dubai	66.7
Rio de Janeiro	83.1	Johannesburg	67.2	Kuala Lumpur	66.7
Shanghai	82.2	Mumbai	67.2	Santiago	61.5
Moscow	81.8	Kuala Lumpur	67.1	New Delhi	60.8
Mexico City	81.2	Riyadh	66.5	Lima	59.3
Riyadh	80.8	Buenos Aires	66.4	Rio de Janeiro	59.3
Sao Paulo	80.5	Istanbul	66.4	Sao Paulo	59.3
New York	79.1	Lima	66.1	Mumbai	57.9
Paris	79.1	New Delhi	64.6	Jakarta	57.4
Ho Chi Minh City	78.7	Rio de Janeiro	64.6	Istanbul	57.0
Casablanca	76.4	Moscow	61.7	Ho Chi Minh City	56.9
Lima	75.0	Mexico City	61.1	Manila	56.9
Baku	72.8	Sao Paulo	60.6	Dhaka	54.8
Manila	72.5	Bangkok	60.4	Johannesburg	52.6
Bogota	71.6	Jakarta	59.3	Karachi	51.7
Jakarta	71.4	Manila	58.2	Bangkok	51.1
Caracas	70.9	Quito	58.1	Casablanca	50.8
Quito	70.9	Ho Chi Minh City	54.6	Yangon	49.5
Mumbai	69.9	Karachi	54.0	Mexico City	45.5
Cairo	68.8	Baku	53.4	Kuwait City	44.6
New Delhi	68.6	Bogota	50.8	Riyadh	41.8
Istanbul	68.5	Cairo	50.1	Quito	33.6
Yangon	65.4	Casablanca	49.4	Bogota	25.0
Bangkok	64.1	Dhaka	40.8	Cairo	22.0
Lagos	63.4	Caracas	38.3	Lagos	20.6
Dhaka	48.0	Yangon	34.1	Baku	19.6
Karachi	30.4	Lagos	30.5	Caracas	19.3

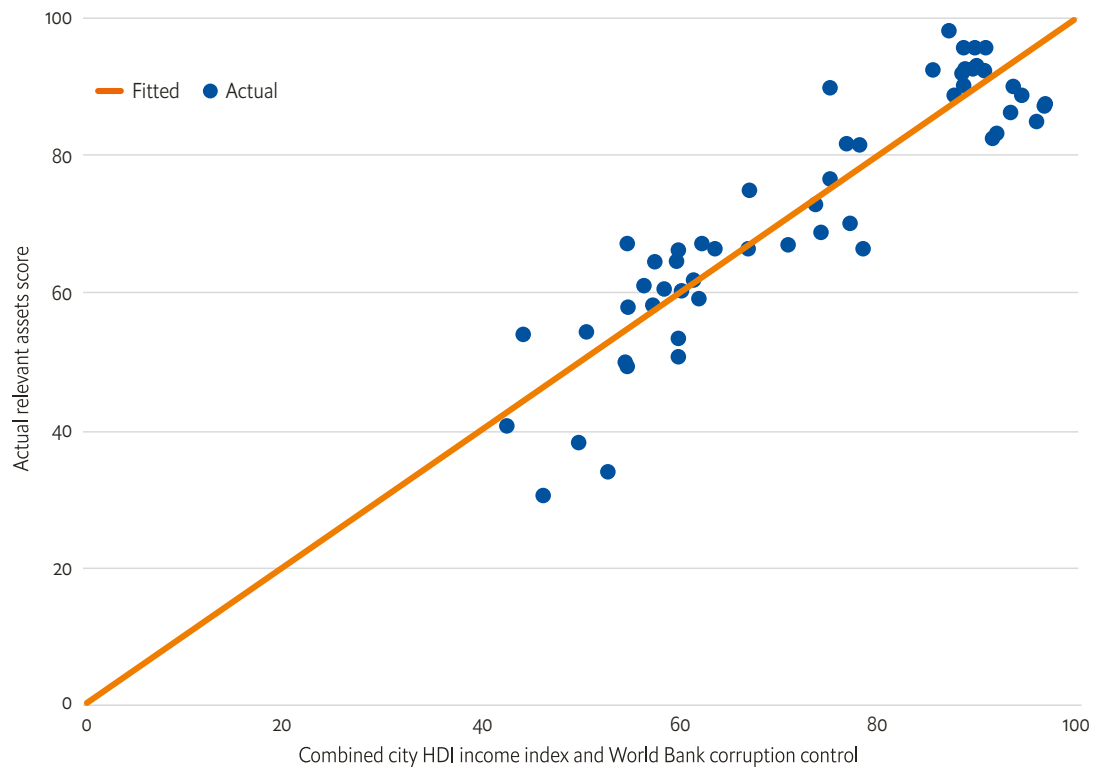


As noted above, the actual losses from shocks over the past decade has been comparatively small, so the damage and threat multiplier score is an indication of relative rather than absolute risk. Most cities nevertheless score above 75 out of 100, which the SCI classifies as very good. That said, the extent of damage from shocks and the existence of particular aggravating dangers decline markedly with wealth. Developed cities are certainly not immune to danger: Wellington, Paris, London and New York have all seen major terrorist atrocities in the past two decades. In San Francisco and Los Angeles, “the Big One” is

the local euphemism for an expected large eruption along the San Andreas Fault in the coming years or decades. Nevertheless, the greater risk from shocks appears to be in the world’s emerging mega-cities such as Karachi, Dhaka and Lagos. Mr Bollyky notes that “many low- and middle-income cities face the potential for catastrophic risk; they are exposed to climate change and insecure in health terms.”

Given this risk distribution, it is unfortunate that income and transparency are also the correlates of both having relevant assets in place.

**Figure 10: Wealth and transparency redux**  
City income and transparency versus relevant assets





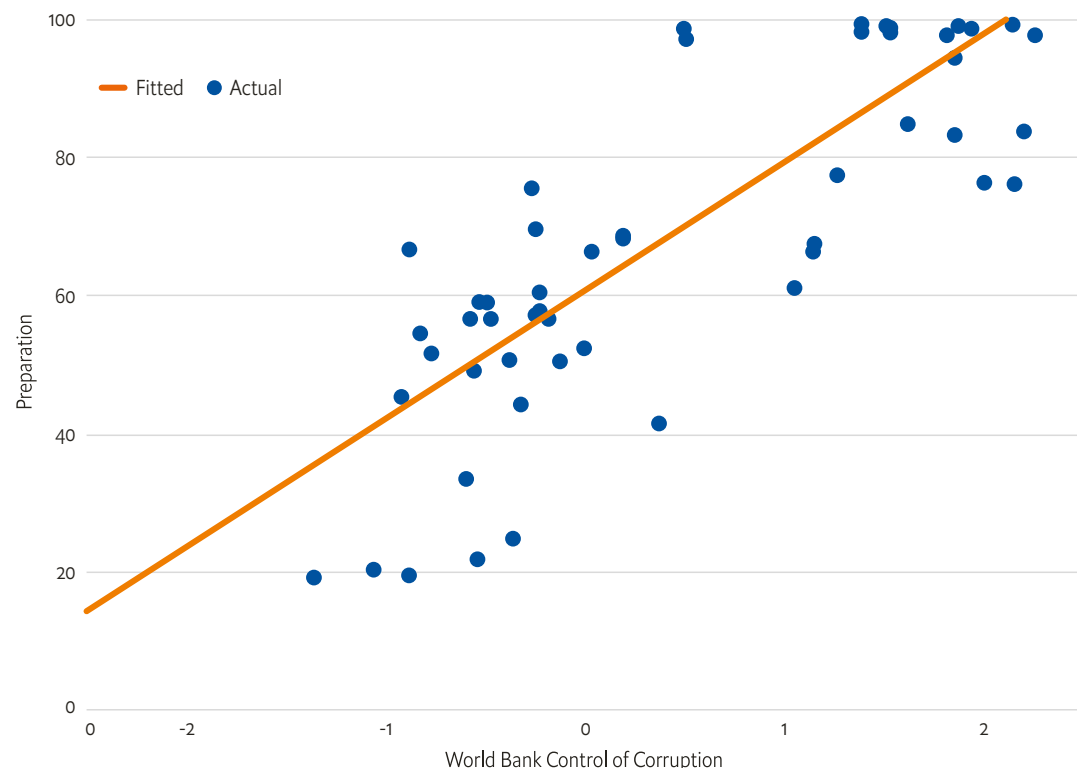
Turning to preparation, two facets of scores there are particularly noteworthy. First is the much wider disparity between the top and bottom of the table than in other areas: 18 cities score over 95 points, while 23 fall below 60. Again, relative scores should not give the wrong message. Mr Leon warns that no urban area should be complacent: “We cannot say that any city is completely prepared for what is coming because we really don’t know what is coming. All need to work toward resilience. If a person wants to be physically fit, daily exercise, a good diet and good sleep are necessary.

Similarly, if you want a healthy and resilient city, permanent work on resilience building is—and should be—a never ending exercise.” Those scoring above 95, then, are not so much perfectly prepared as doing far better than the many cities at the other end of the scale.

Although income and transparency usually have a similar significance in correlations elsewhere in the SCI, income is statistically insignificant here when transparency is factored in. The implication is that a well-governed city, even with constrained economic resources, can make important progress on resilience.

**Figure 11: Be transparent to be prepared**

World Bank Control of Corruption scores versus index preparation scores







## Becoming more resilient

A general guide to improving resilience, were such possible, would be well beyond the scope of this study. Instead, we offer insights from experts for policymakers looking to address the issue.

To begin with, good general infrastructure, such as roads and buildings with a capacity to cope with earthquakes or floods, certainly can help. Professor Nakamura notes, for example, that a key lesson that other countries could learn from Japan's experience with natural disasters is the value of high-quality civil engineering where needed. Even a single project can have an important effect. Japan's technologically advanced Earthquake Early Warning system almost certainly saved lives by giving Tokyo residents around 80 seconds of warning before the 2011 earthquake hit. London, meanwhile, has not seen a major flood since the completion of the Thames Barrier. The benefits of better infrastructure help explain some of the lower natural disaster damage experienced in wealthier cities.

Such assets can require substantial capital outlay. Governor Koike notes that, for cities, this is a wise investment rather than an expense. "When a disaster strikes and you are unprepared, you realise truly how costly the loss can be. Therefore, we believe that preparedness is critical, in terms of doing everything possible to take preventive measures and be ready."

This does not mean that developing world cities cannot become more resilient, for two

reasons. First specific building-code regulations or projects, however beneficial, are the result of resilience, not its core. Second, much of resilience preparation is not costly.

Efforts in this area need to begin with keeping sustainability and resilience in mind when setting policy. This can require creativity and focus, especially for less well-off cities acknowledges Mr Ijjaz-Vasquez. "If you don't have a lot of money, you need to find the best actions to take to get the most for it. That is not a trivial question. Is your big risk cholera in a flood, or crime, or is the next big challenge drought? Resilience can be technically difficult."

Nevertheless, most initiatives are not inherently expensive. Sometimes better resilience involves not spending money in certain ways, notes Mr van Begin. "In your budget, if you have an item investing so many dollars in creating lots of parking space for individual cars rather than on increasing use of public modes of transportation, that is already an indication you may not be on the right track." More specific to shock prevention, housing and residential planning should keep the potential for disaster in mind. Even something as basic as making sure that "unregulated settlements do not grow into areas that get flooded every year saves everybody a lot of money by not having to deal with a crisis," says Mr Ijjaz-Vasquez. "It is not expensive but an issue of paying attention." Unfortunately, only under half of index cities (25)—all from high-income countries with the exception of Beijing and Shanghai—take disaster risk into account in urban planning.

YES	PARTIALLY	NO
Amsterdam Barcelona Beijing Brussels Chicago Copenhagen Dallas Frankfurt Hong Kong London Los Angeles Madrid Melbourne New York Osaka San Francisco Seoul Shanghai Singapore Sydney Taipei Tokyo Toronto Washington, DC Wellington	Abu Dhabi Bangkok Buenos Aires Casablanca Dhaka Dubai Ho Chi Minh City Istanbul Jakarta Johannesburg Karachi Kuala Lumpur Kuwait City Lima Manila Mexico City Milan Moscow Mumbai New Delhi Paris Quito Rio de Janeiro Rome Santiago Sao Paulo Stockholm Yangon Zurich	Cairo Riyadh Lagos Bogota Caracas Baku

**“Only under half of index cities (25)—all from high-income countries with the exception of Beijing and Shanghai—take disaster risk into account in their own city-level planning”**

#### Quantitative assessment

0. No (disaster risk not been accounted for in either national economic development plans, or in city-level urban planning)

1. Partially: only in the active national development/strategy(s)

2. Yes to both: accounted for in both the active national development plan/strategy and in city-level urban planning (eg, through policies, directives, urban development plans/strategies)

**Units:** score 0-2

**Year:** 2019

#### Description

Is disaster risk included and accounted for in:

- active national development plan/s; and
- city level urban planning/design?







One element of paying attention to resilience is ensuring, through joint planning for preparedness, that all of the systems in a city are co-ordinated. London is a good example of what this looks like in practice. In Britain, explains Lord Hogan-Howe, a legal requirement exists for central and local government, as well as other relevant stakeholders, to co-operate in local committees established to plan for possible emergencies. In London, this committee meets once a quarter. The biggest natural threat is flooding, so a specific warning system and reaction capacity have been developed should this occur. All key stakeholders, not just paid emergency services but also volunteers, also share a radio system for use should disaster strike and they engage in joint exercises to prepare. Based on the result of such exercises, the committee considers any necessary revisions to its standing contingency plan. “On the whole, it is pretty well organised,” says Lord Hogan-Howe, “but at the extremes any society would be challenged.”

Better technology and more co-operative planning as described here are essential, but they are hardly new ideas. As the concept of resilience develops, though, it is also pointing in innovative directions.

One of the two biggest examples is a major shift in thinking about the nature of appropriate infrastructure. Mr Tomer reports “a bit of a back-to-the-future element,” with infrastructure ideally no longer fighting against, or superimposing itself upon, nature. Instead, cities should be asking “how do we use existing natural infrastructure to our benefit.”<sup>16</sup>

Mr Ijjaz-Vasquez agrees that, increasingly, cities interested in resilience are “making it a priority to use nature and green assets to deal with risks”—a particular consideration for cities without money for huge projects. He cites the example of Colombo in Sri Lanka. After floods in 2010, a post-disaster assessment highlighted the importance of existing natural wetlands for rainwater absorption and overall flood management. Unfortunately, Mr Ijjaz-Vasquez explains, development had occurred or was taking place in many of these areas. The city’s urban plan therefore now calls for the mapping and protection of wetlands. Meanwhile, to maximise the benefits of this restriction on development, Colombo has created two large parks out of some of the protected areas so that residents can use them for recreation during the large majority of time that they are not flooded. The parks are also used for educational and awareness raising events involving city residents, in order to illustrate the importance of sustainable and integrated development of the urban environment, and thereby to contribute further to Colombo’s resilience.<sup>17</sup> As Professor Nakamura notes of infrastructure development in general, it is not a binary choice between development or non-development. “We always need to find the right balance between the nature that needs to be preserved and the convenience that needs to be provided,” he says.

Just as the concept of resilient infrastructure is evolving, so too is understanding of the kind of co-operation required to deal with shocks. In particular, cities are recognising the essential importance of social resilience, which is the

<sup>16</sup> For more in depth discussion of what this means in practice, see Earth Economics and 100 Resilient Cities, *Building Urban Resilience with Nature: A Practitioner’s Guide to Action*, 2018; Steffen Lehmann, “Reconnecting with nature: Developing urban spaces in the age of climate change,” *Emerald Open Research*, 2019.

<sup>17</sup> See also Global Facility for Disaster Reduction and Recovery, “Urban Wetlands Management in Colombo: A new model for urban resilience,” 2018; “Colombo’s wetlands float to top of flood prevention plan,” *Reuters*, 22 May 2018.



ability of communities as a whole to work together when necessary. Professor Nakamura recalls that the number of casualties and extent of damage arising from the 1995 Kobe Earthquake and its aftermath differed markedly between neighbourhoods. Extensive research into these variances found that “the crucial difference boiled down to whether the people [in these areas] had day-to-day chit-chats with their neighbours,” he says. “Were there community events? Did neighbours know each other’s faces and names? These sorts of things—in other words, social capital—deeply impacted how well they could, say, hold a rope together, or pass water buckets from point A to point B.”

Kobe’s experience is not unusual. Research has shown the crucial importance of social capital in how well individuals, neighbourhoods and cities weathered and recovered from crises as diverse as the Paris heatwave of 2003, Hurricane Katrina in the US, and the Japanese tsunami of 2011.<sup>18</sup> Even in so developed a location as the wider metropolitan tri-state area centred on New York City, these personal links are crucial when a crisis occurs. In the aftermath of Hurricane Sandy, those who were most affected reported that they got the majority of their help from family, friends and neighbours.<sup>19</sup> Technology can also help: studies show that social media use increases, especially among medium users, in the wake of a disaster as people post data that may be key to others.<sup>20</sup>

Cities can take specific steps to enhance social resilience, both specific and general. Paris has

examples of both. Officials can try to plug particular holes where it may be lacking. In the aftermath of the 2003 heatwave in Europe, which killed nearly 15,000 in France alone, Paris drafted response plans that include, once a certain temperature is reached, having health officers visit everyone on a register of vulnerable individuals to see what assistance they may need.<sup>21</sup> More generally, notes Paris’s deputy mayor, Emmanuel Grégoire, one reason his city invests in addressing social inequalities is “because, the more cohesive a community is, the more it is able to face challenges and to have a resilience strategy.”

Urban governments can also recognise the importance of the community’s role and integrate relevant groups within their planning. As noted above, London’s emergency exercises include representatives of voluntary organisations. Lord Hogan-Howe stresses that this is not tokenism. “It would be too expensive to create the necessary capacity” to address a crisis and then have it standing by unused for most of the time. “Volunteers will keep us going if these events occur.” Similarly, Mr Grégoire explains that Paris’s resilience policy “represents a large partnership with a lot of kinds of collaborators—public organisations and the state level, of course, but also inhabitants, private companies, other organisations and NGOs. It’s only if we work together that we will be able to face these challenges.”<sup>22</sup>

Most important for resilience, however, is creating the space to allow the ties of community to build

<sup>18</sup> Richard Keller, *Fatal Isolation: The Devastating Paris Heat Wave of 2003*, 2015; N. Nirupama et al., “Role of social resilience in mitigating disasters,” *International Journal of Disaster Resilience in the Built Environment*, 2015; Jeanne Leroy et al., “Vulnerability and social resilience: comparison of two neighborhoods in New Orleans after Hurricane Katrina,” *E3S Web of Conferences: 3rd European Conference on Flood Risk Management*, 2016

<sup>19</sup> Associated Press-NORCCenter for Public Affairs Research. “Resilience in the Wake of Superstorm Sandy: Research Highlights,” 2013.

<sup>20</sup> Meredith Niles et al., “Social media usage patterns during natural hazards,” *PLOS One*, 2019.

<sup>21</sup> “Canicule”, Government of Paris web site, accessed 2 May 2019.

<sup>22</sup> The interview was conducted at the Urban 20 (U20) Mayor’s Summit / Urban Resilience Forum Tokyo (URF) in Tokyo on 21 May, 2019



by themselves. Ms Johnston explains that cities can contribute in two relatively simple ways. One is focusing on quality-of-life issues, such as neighbourhood cleanliness, lighting and whether public services like urban transportation work. This creates a virtuous circle: by giving people a sense of safety, residents will be more willing to go into public spaces, thereby making them safer still. In this way, she says, “cities can have a direct effect on renewing neighbourhoods.”

Similarly, Ms Johnston adds, urban officials can play an important role in building social

cohesion and a sense of community “by creating not only physical but social spaces.” This might include sponsoring events or creating spaces where families and groups of citizens can meet safely to engage in sporting, cultural or educational activities. In other words, the same recipes for safety go a long way to encouraging the social linkages that are the key to resilience. Resilience, then, is not a separate category with an occasional relationship to urban safety: the two are intertwined.

## Q&A with a city leader—Lord Bernard Hogan-Howe, former commissioner, London Metropolitan Police



*The Economist Intelligence Unit: Are there any recent innovations in improving security in London that you think would be of particular interest or relevance to other cities?*

**Lord Hogan-Howe:** As I was leaving the Met, we were giving 23,000 police officers body video. It cost £9m and has an impact on collecting evidence, but its biggest impact is that it holds police to account on the street. Over the last 40 years that I’ve been with the police, many of the changes for good have been driven by things like CCTV in police holding areas and recorded interviews. This is the next step.

Because of these changes, things have improved immeasurably. Now I can’t remember any recent case where police lied and lost a conviction. If you improve accountability in ways that show provable integrity, it is a real benefit. Over the years, this has had a profound effect: complaints have dropped

by at least a half. These changes also enhance the sense of the rule of law because if police are trusted, the courts are too.

*The Economist Intelligence Unit: To what extent is it possible to get in front of crime with prevention, especially with data analytics, and how far is policing in part inevitably reactive?*

**Lord Hogan-Howe:** Although we’ve always claimed that there is a prevention strategy, I don’t think it has been fully embedded. CCTV is widespread in London and has let us have a 95% murder clear-up rate. It is ubiquitous, though, because we did not have a strategy when it was being deployed. That reflected how society appreciated the benefits of CCTV before it perceived a threat to intrusion into privacy. That said, Londoners’ experience of CCTV has been broadly positive.



There are, for example, good preventative actions around design in schools and public buildings, but they are not as good as those for fire prevention. In the same way, things like insurance have incentivised good behaviour in preventing fire but have not done [the] same around crime.

Public places can be designed to reduce crime by making it harder to steal cars or engage in burglaries—there are some good efforts to do so but this could be embedded better. We can control some drugs markets better because, when they are distorted, you get more violence. A third area is alcohol control: if that is not well monitored you can get difficulties. Finally, young people are disproportionately affected by crime and can learn how not to be victims, but they have not been incentivised to do so.

It is possible to have a structure to prevent crime, but we can do more.

*The Economist Intelligence Unit: What lessons might London's experience of dealing with various kinds of terrorists provide for other cities?*

**Lord Hogan-Howe:** At the point terrorists attack, you have a problem. It is best to have a strong

strategy that stops it occurring. The UK strategy is based on prevention, protection and pursuit. First, we focus on stopping at the planning stage, or protecting places where terrorists would likely attack and, if they do get through, responding accordingly. These are things you have to embed in central and local governments. Success also depends on the level of trust between the various services. In the UK that has been excellent.

*The Economist Intelligence Unit: What are some of the challenges in policing such an open and vibrant city as London?*

**Lord Hogan-Howe:** There is a point of balance you have to strike in a liberal democracy between the rights of a citizen and the ability to intrude in people's privacy. Where this balance lies can impact how effective your security services can be. Any debate has to think about that: if you have less intrusion, you may have more risk. Some really safe countries are very intrusive and draconian, but you have to decide if you want to live there. I probably wouldn't.



## Conclusion

Mr Bollyky says that “the future of global health is urban health.” Given the growing number of people residing in cities and the ever-greater influence they will have on how we as a species live, the future of day-to-day global human security is, to a large degree, urban security.

Creating safe cities, however, is far from straightforward. Different kinds of security intersect in any number of ways and shocks can reveal that apparent safety has as much to do with luck covering over ignorance, as it does any underlying level of protection. Throughout this study, drawing on the results of the SCl2019, several broad themes keep reappearing that are of relevance to urban policymakers seeking to enhance the security of their cities:

- **Urban safety is both multi-faceted and indivisible:** a range of different kinds of security go into someone being, let alone feeling, safe. Accordingly, our index has four pillars, themselves composed of multiple indicators. All are important to quality of life. Those individuals tasked with protecting cities in any of these fields, though, should understand the close links between kinds of security, which, on the surface, seem quite distinct. Problems in any one area can undermine other sorts of security quite quickly.
- **For safety, wealth is an asset, not a strategy:** richer urban areas tend to be safer ones, but this does not result simply from some notional purchase of security. Those cities with higher per-head income are also more engaged with the issue, as shown by more detailed policies even for areas where cost is not high. For example, integrating disaster risk into urban planning need not cost the earth—sometimes it simply means not developing in a way that undermines natural protections against various dangers. Nevertheless, such an approach will greatly enhance the safety of a typical city resident over the long term. Those in less well-off cities need to focus more on how they can, within the constraints they face, enhance security. On the other hand, policymakers in wealthier cities need to understand that they cannot afford to lose the focus on safety, and increasingly resilience, amid the other concerns they face.

- **Transparency and accountability undergird safety:** safe cities require good governance. For our overall SCI scores, transparency is about as important as per-head income. For resilience, it is the dominant correlate. In the absence of accountability, not only do those charged with providing safety face greater temptations to sacrifice it to their own private interests, but also ordinary citizens are less willing to engage in even well-intentioned efforts to enhance their security. Honest government also need not be expensive: for several years, France and Barbados have had similar, usually relatively good, scores in Transparency International's Corruption Perception Index, but the latter's GDP per head is less than half that of the former.
- **The provision of safety is a joint, even a social, activity:** urban safety is a multi-faceted field requiring the mutual re-enforcement of efforts from across a range of different security pillars. At a minimum, this requires some form of integrated joint planning and consideration of issues of common concern. More generally, it involves the engagement of citizens, businesses and civil society organisations in their own security in areas as diverse as living healthy lifestyles, willingness to report crimes, and keeping their computer systems virus free. When cities face extreme shocks, the importance of social engagement inevitably proves crucial. Here, policymakers should work on building trust with the population—in part through transparency—and, even more important, creating the opportunities for social bonding and civil society to flourish.

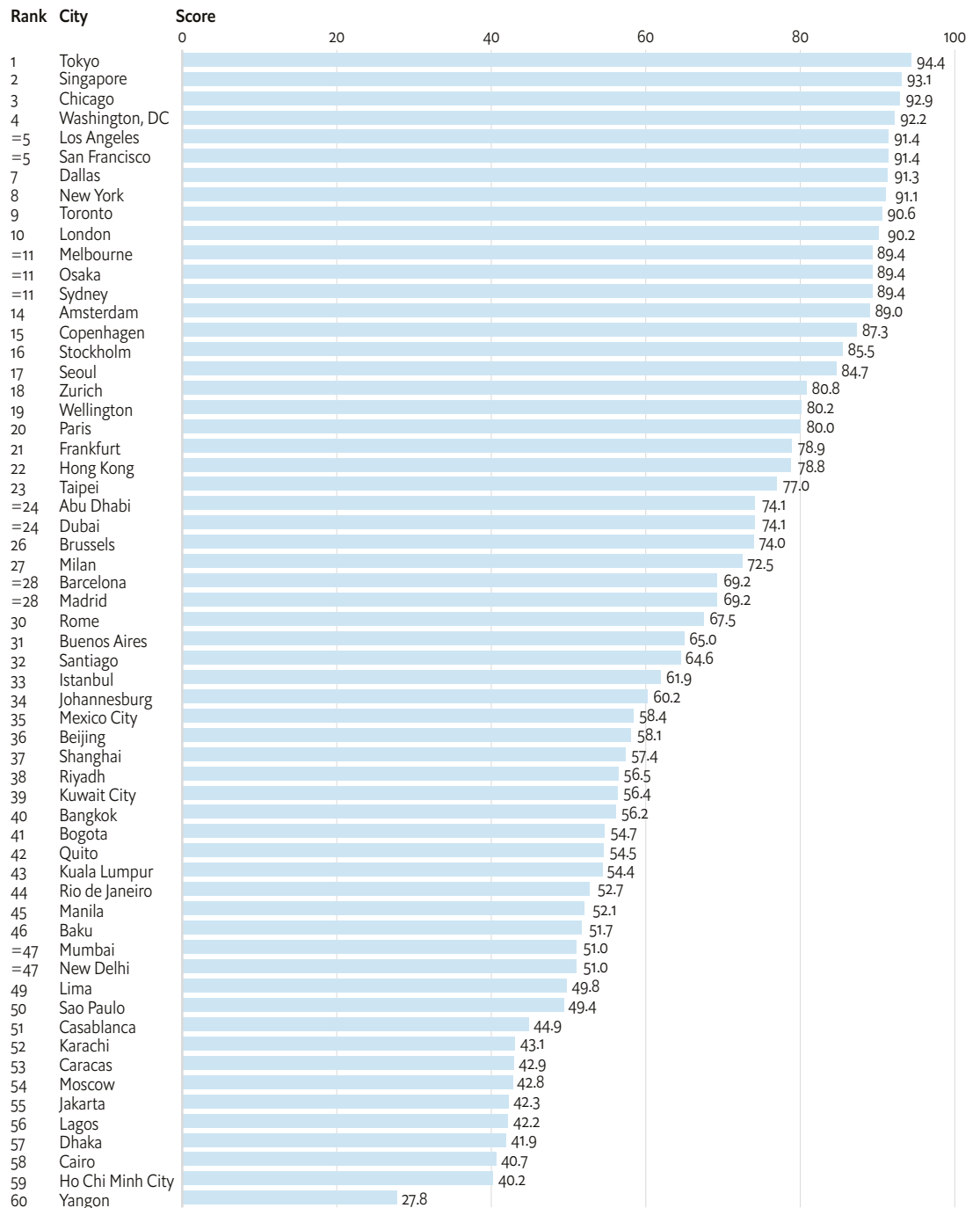




## Appendix

### Digital security 2019

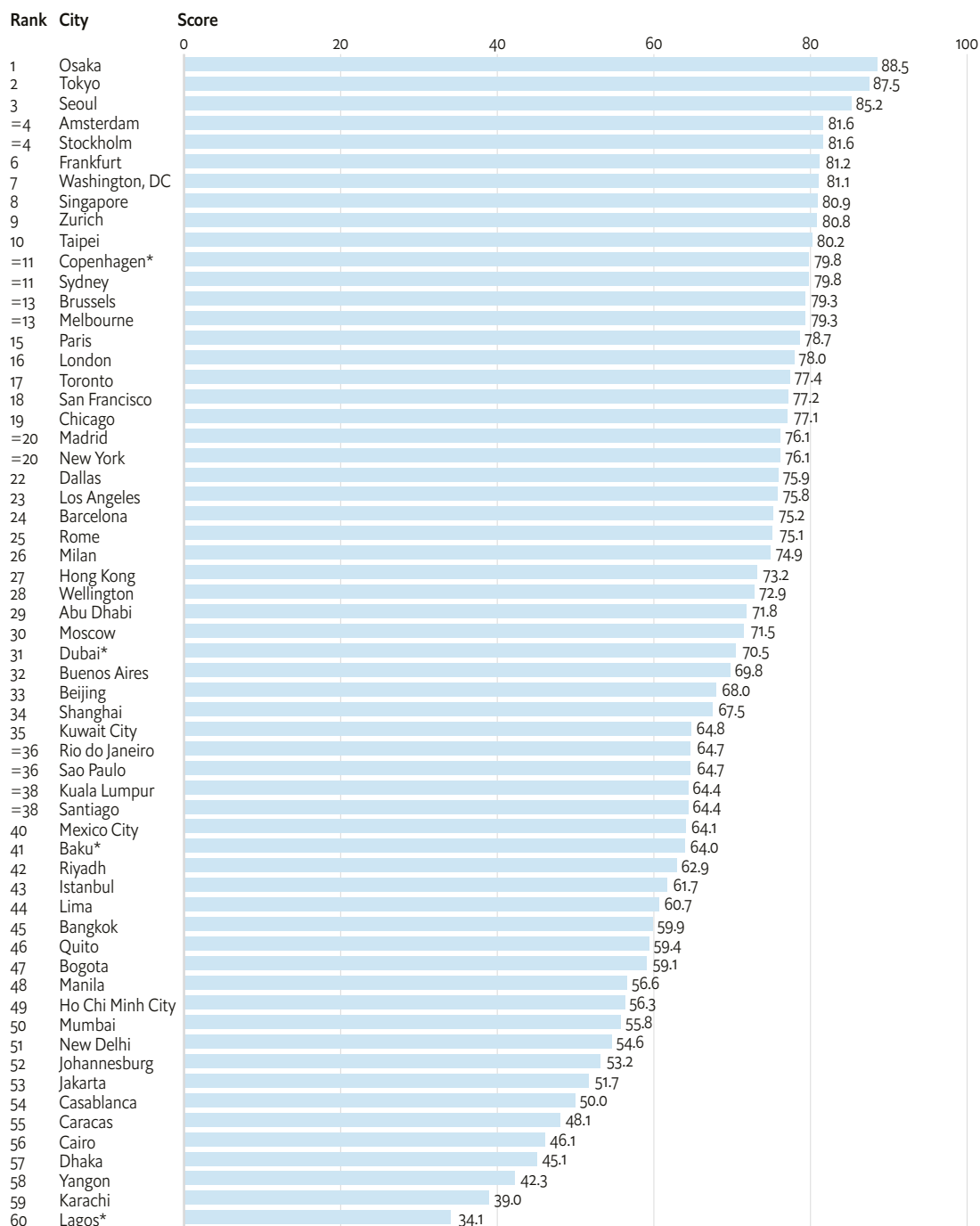
Average: 67.2



\* = new cities

### Health security 2019

Average: 68

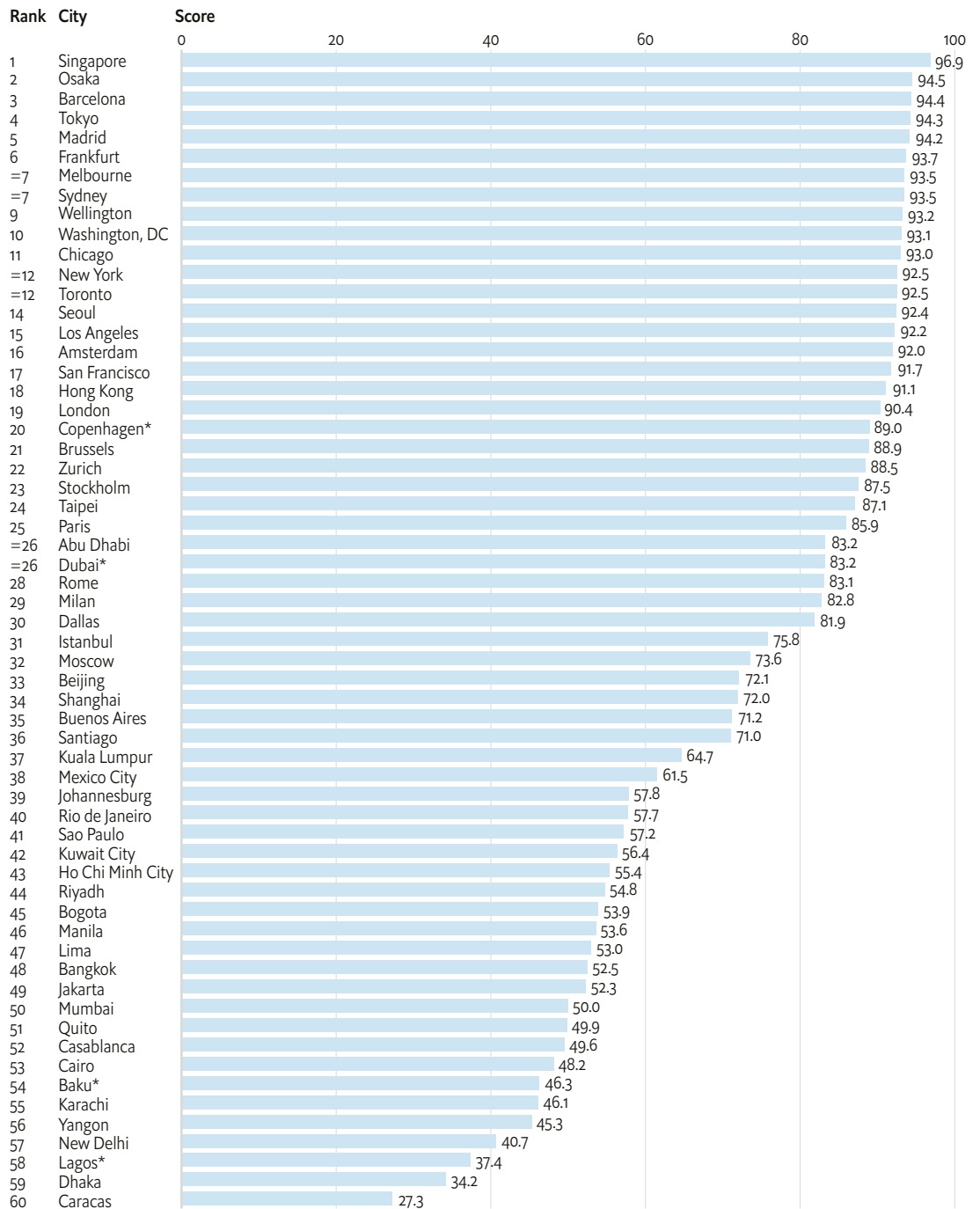


\* =new cities



### Infrastructure security 2019

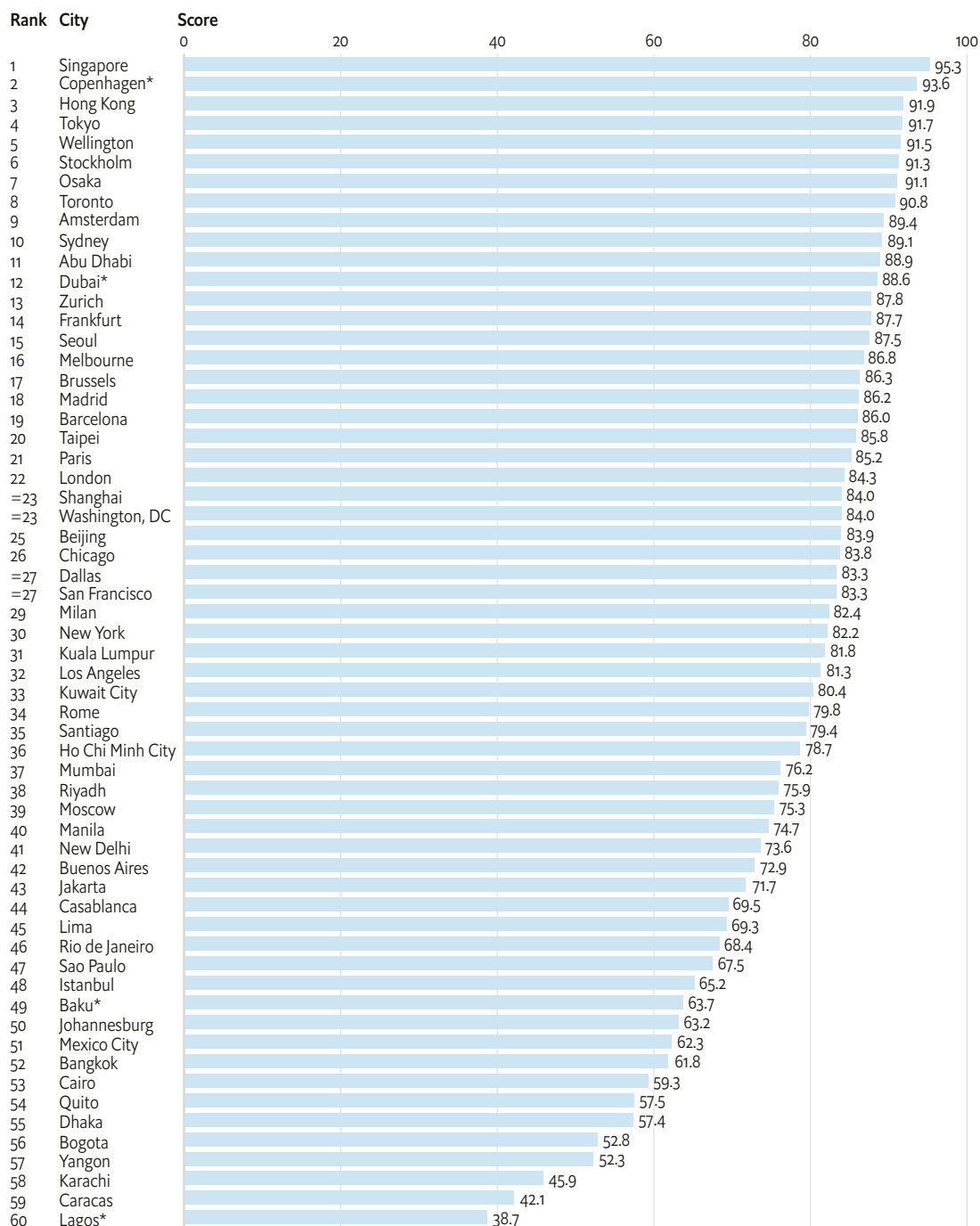
Average: 72.5



\* = new cities

### Personal security 2019

Average: 77

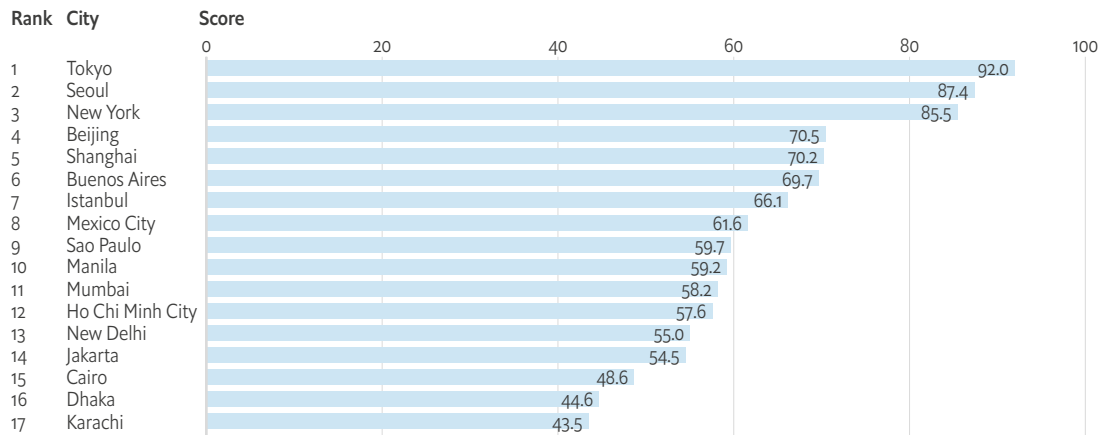


\* =new cities



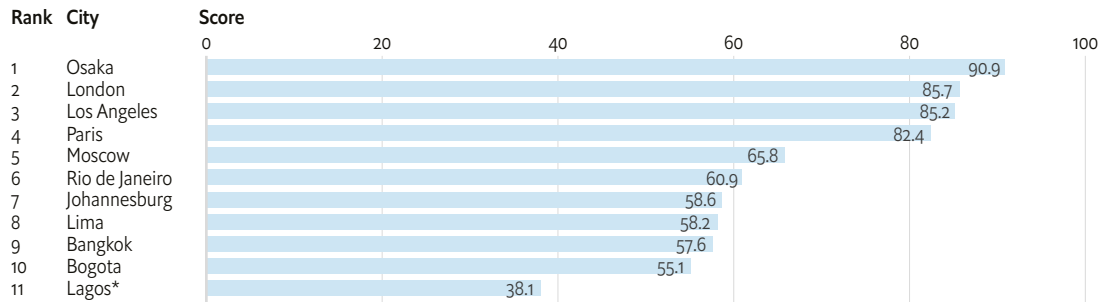
### Rankings by population: >15m

Average: 63.8



### 10-15m

Average: 67.1

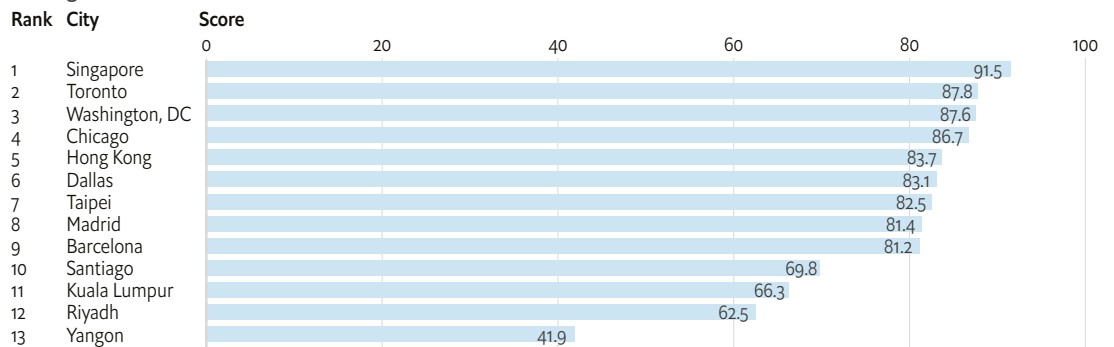


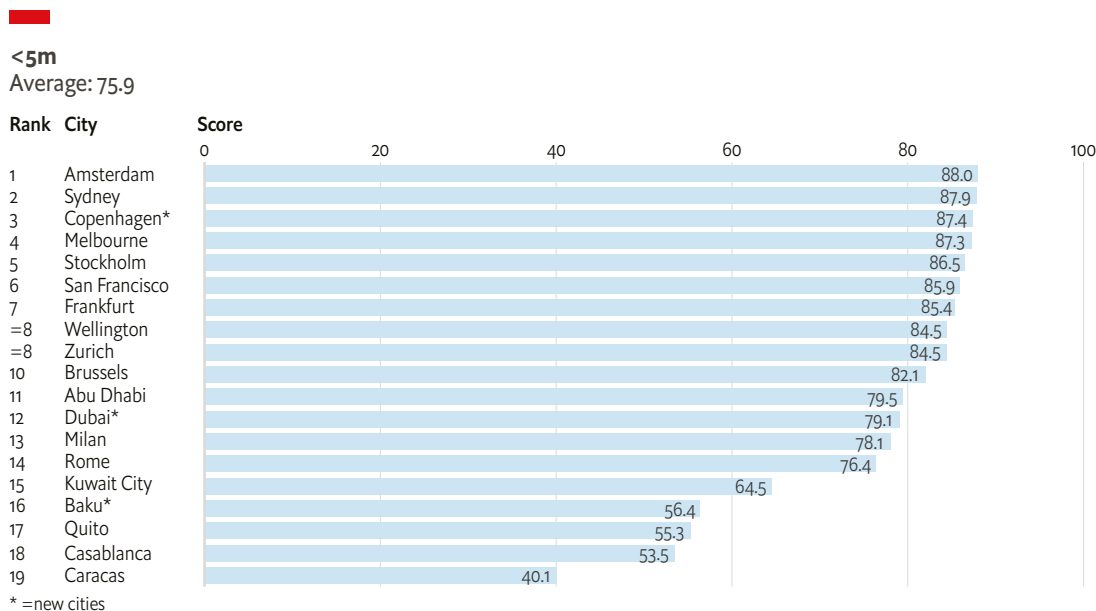
\* =new cities



### 5-10m

Average: 77.4





## I. Overview

In 2015 The Economist Intelligence Unit developed an index assessing the safety of major cities across the globe, across four domains: digital security, health security, infrastructure security and personal security. The SCI2015, sponsored by NEC Corporation, was developed in response to critical concerns surrounding urban and public safety.

Present UN estimates show that in 2018 a little more than half of the world's population are living in urban areas and this number is bound to rise, projected to reach 68% by 2050.<sup>23</sup>

This rapid rise in urban populations has caused immense pressure on existing resources, often giving way to an unruly urban sprawl. In light of these trends, there are valid concerns around the safety of these cities, be it the safety of a city's residents from terror attacks or from road accidents.

In this context, it is imperative that we understand the landscape of public safety, particularly in urban areas. To continue enhancing our understanding of the current situation and identify critical changes since the release of the second edition in 2017, NEC Corporation has sponsored a third edition of this research.

## II. Differences between the 2019 and the 2017 indexes

The SCI was launched in 2015, ranking 50 cities on 44 indicators across the four domains of digital security, health security, infrastructure security and personal security. In its second edition in 2017, the index was expanded to include more cities, ranking 60 cities based on 49 indicators in the same four domains.

In this third edition of the index (2019), the core focus continues to be centred around digital security, health security, infrastructure security and personal security. The 2019 index ranks

<sup>23</sup> <https://www.un.org/development/desa/publications/2018-revision-of-world-urbanization-prospects.html>





60 cities, on 57 indicators. In this edition, The Economist Intelligence Unit has modified the framework to increase focus on gauging a city's climate change or disaster risk resilience/preparedness.

Due to the change in city coverage and additional indicators, direct year-on-year comparisons between cities are not possible. Scores and rankings reflect the relative

performance of a city and should be considered for the year in scope, especially due to changes in methodology/indicators and cities in scope in the 2019 edition.

### III. Change to list of cities

The 2019 index includes four new cities, while four cities have been removed from the 2017 sample. This keeps the total number of cities in SCl2019 unchanged at 60.

#### New cities added to the 2019 index

Copenhagen	Athens
Dubai	Jeddah
Lagos	Doha
Baku	Tehran

#### Cities removed from the 2019 index

### IV. New indicators or updated indicators in the 2019 edition

Globally, a rise in the number of extreme weather events owing to climate change has led to growing concern and awareness around the impacts and differing city-level/disaster risk preparedness. To address this growing

concern, the 2019 index includes four new indicators related to disaster/climate-change preparedness. Furthermore, new indicators have been added to highlight changing global trends, use stronger composite indicators and broaden the coverage across benchmark domains.

#### Climate change indicators:

##### Domain

Infrastructure

Personal

##### New indicators

- Institutional capacity and access to resources
- Catastrophe insurance
- Disaster-risk informed development
- Hazard monitoring

## Other indicator additions/updates:

Domain	New indicators
Digital	• Risk of local threats
Health	• Emergency services in the city
Infrastructure	• Road traffic deaths • Air transport facilities • Road network • Rail network • Power network • Cyber-security preparedness
Personal	• Effectiveness of the criminal justice system • Data-driven techniques for crime

## Changes to the framework:

Domain	Previous	Current	New indicators
Digital	8	8	• Added: Risk of local threats
Health	12	13	• Added: Emergency services in the city
Infrastructure	10	15	• Added: Air transport facilities • Added: Rail network • Added: Cyber-security preparedness • Added: Institutional capacity and access to resources • Added: Catastrophe insurance • Added: Disaster-risk informed development • Updated: Road traffic deaths • Updated: Road network • Updated: Power network
Personal	19	21	• Added: Effectiveness of the criminal justice system • Added: Hazard monitoring

## V. Index domains

Every city in the index is scored across input and output performance within and across the four domains. Each domain comprises between eight and 21 indicators, which are divided between inputs (capacity/preparedness-driven), such as policy measures and access to services or resources, and outputs (performance-driven), such as air quality and the prevalence of crime.

**Digital security** assesses the ability of urban citizens to freely use the internet and other

digital channels without fear of privacy violations or identity theft. On inputs, cities are scored on their awareness of digital threats, the level of technology employed and the existence of dedicated cyber-security teams. On outputs, the index measures the risk of local threats and the estimated number of computers infected with a virus. One indicator was replaced in this domain (frequency of identity theft) with risk of local threats with a view to use a stronger dataset and remove inherent scoring biases due to a paucity of data.



**Health security** measures how cities fare in terms of environmental policy (design and implementation) as well as the level and quality of healthcare available to residents. On inputs, cities are scored based on their environmental policies and the access to and quality of healthcare services. Output indicators include air and water quality, life expectancy, infant mortality and other sub-indicators. One new indicator covering emergency services in the city was added to this domain of the indicator framework in the 2019 methodological refresh of the SCl.

**Infrastructure security** considers the built physical environment, such as city infrastructure and its vulnerability to disasters and terrorist attacks. On inputs, the index takes into account sub-indicators such as the quality of infrastructure as well as the enforcement of transport safety, while on outputs the number of road traffic deaths is included, as well as the number of terrorist attacks on facilities and infrastructure. Three existing indicator methodologies were refreshed, six new indicators were added and one indicator was removed from this domain of the indicator framework in the 2019 version of the index.

**Personal security** considers how at-risk citizens are from crime, violence, man-made threats and natural disasters. Input indicators in this domain take into account policies and decisions such as the level of police engagement, the use of data-driven crime prevention, the overall political stability of the country where each city is located and new indicators to measure natural disaster preparedness. On outputs, the index takes into account the prevalence of petty and violent

crime, safety perceptions, threat of civil unrest and new indicators assessing the effectiveness of the criminal justice system.

## VI. Indicators

The SCl2019 comprises 57 individual sub-indicators (quantitative and qualitative).

**Quantitative indicators:** 17 of the index's 57 indicators are based on quantitative data—for example, the number of road traffic deaths per million inhabitants.

**Qualitative indicators:** 40 of the 57 indicators are qualitative assessments based on our methodology—for example, The Economist Intelligence Unit's political stability risk scores.

## VII. Data sources

A team of researchers collected data for the index from February to April 2019. In addition to data from The Economist Intelligence Unit, which has produced a number of similar indices that measure cities on liveability, the cost of living, operational risk and various other benchmarks, publicly available information for the latest available year from official sources has been used where applicable. Examples of leading academic/published sources include the World Health Organisation, Transparency International, Kaspersky Lab and various others (see table below). Where available, the data used is city-specific; otherwise, proxies using regional or national data were used instead.

## VIII. Indicator normalisation

In order to be able to compare data points across cities, as well as to construct aggregate scores for each city, the project team had to

first make the gathered data comparable.

To do so, the quantitative indicators were normalised on a scale of 0-100 using a min-max normalisation, where each score represents standard deviation/s from the mean, with the best performing city scoring 100 points and the weakest performing city scoring 0.

Qualitative indicators were normalised as well. In some instances, those scores were on a scale of 0-100. In others, a scale of 1-5 was used, with 1 being the lowest or most negative score, and 5 being the highest or most positive score—these were normalised in a similar manner to quantitative indicators.

Other indicators were normalised on a two-, three- or four-point scoring scale. For example, the indicator “dedicated cyber-security teams” was normalised as per the following guidelines: a city with neither a national- nor city-level cyber-security team scored 0; a city that had only a dedicated national cyber-security team scored 50; and when a city had a dedicated city-level cyber-security team, it scored 100.

While normalised values (that is, a score of 0-100) allow for direct comparability with other normalised indicator scores, min-max scoring also leads to changes in scores from the previous edition of the index, even without an actual change in raw data-driven performance. For example, in an indicator with normalised scoring, if the score of the weakest performing city is lower than that in the previous edition of the index, the scores of other cities in scope will be impacted regardless of actual (raw data-driven) performance.

## IX. Index construction

The index generates an aggregate score/ranking across all underlying indicators. The index is first aggregated by domain—creating a score for each domain (for example, personal safety)—and finally, overall, based on the composite of the underlying domain scores.

To create the underlying domain scores, each underlying indicator was aggregated according to an assigned weighting. Sub-indicators are all weighted equally, as are the four domains. The tables at the end of this appendix contain domain and indicator-level (outputs and inputs) specifics (new or updated indicators are highlighted in green).

## X. Some caveats

To get the most value of SCl2019, its limitations—inevitable in any model of a very complex reality—should also be acknowledged.

First, we could include only information with broadly comparable data available across all 60 cities. This constrained the choice of indicators. For example, as discussed in the Washington, DC, case study, a review made clear that such figures no longer existed for vehicle accidents and digital identity safety, leading to a selection of new metrics.

A lack of urban-level data has also made it necessary sometimes to rely on national figures. In most cases this is unlikely to make much difference but in others it could. We needed to use country figures for the number of doctors per head in New Delhi and Mumbai, for example. Given India’s concentration of



medical facilities in urban areas, this likely understates the workforce for each city.

Next, in such an exercise, much data inevitably comes from information gathered by others. This potentially brings its own issues. For example, Beijing and Shanghai's prisoner re-offending rates—taken from China's national figures—are the lowest in the SCl2019 and far ahead of most others. The Chinese government insists that this reflects superior rehabilitation by its prison system. Prisoner rights campaigners in the country, however, insist that it has much more to do with the previous tendency of the state to detain some recently released prisoners without charge and send them to re-education through labour (*laojiao*) camps. Living in a state similar to imprisonment, it would be difficult for these individuals to re-offend. The government has officially closed the *laojiao* system, but campaigners insist that other institutions are playing the same role. Interrogating every controversial datum, however, would make it impossible to complete our index and undermine the transparency of its methodology.

Another issue is that some indicators measure the existence of policies while their quality may remain untested. The scope of a written disaster plan, for example, is likely a sign that it will work better, but the ultimate test will be in response to a disaster. Fortunately, our cities have not seen enough of those to be able to make robust comparisons.

Finally, scores represent city-wide averages. Conditions can vary widely within an urban area, especially between wealthier and poorer neighbourhoods. Again, the ideal should not be the enemy of the good: a neighbourhood-focused index would be in equal parts unwieldy to use and inexact in its details.

Too close a focus on the inevitable imperfections and scoring judgement calls of SCl2019, though, clouds the big picture. The data are the most robust available and the high correlation between individual pillar inputs and outcomes indicates that the result is more or less right.

1. Digital security		Weight: 25%
A. Inputs		
Indicator	Unit	Source
1.1.1. Privacy policy	1 – 5, 5 = strong policy	DLA Piper Data Protection Laws of the World; Economist Intelligence Unit analysis
1.1.2. Citizen awareness of digital threats	0 – 3, 3 = very aware	Economist Intelligence Unit analysis
1.1.3. Public-private partnerships	0 – 2, 2 = close partnerships	Economist Intelligence Unit analysis
1.1.4. Level of technology employed	0 – 100, 100 = highest	Economist Intelligence Unit analysis
1.1.5. Dedicated cyber-security teams	0 = none, 1 = national only, 2 = national and city level	Economist Intelligence Unit analysis
B. Outputs		
1.2.1. Risk of local threats	(0-3), 0: low risk, 3: maximum risk	Kaspersky Lab
1.2.2. Percentage of computers infected	Scale 1 – 5, 5 = most	Kaspersky Lab
1.2.3. Percentage with internet access	%	ITU
2. Health security		Weight: 25%
A. Inputs		
Indicator	Unit	Source
2.1.1. Environmental policies	0 – 100, 100 = best	Economist Intelligence Unit analysis
2.1.2. Access to healthcare	0 – 100, 100 = best	EIU's Liveability Rankings
2.1.3. No. of beds per 1,000	#	World Bank; local data sources
2.1.4. No. of doctors per 1,000	#	WHO; local data sources
2.1.5. Access to safe and quality food	0 – 100, 100 = best	EIU's Global Food Security Index
2.1.6. Quality of health services	1 – 5, 5 = best	EIU's Liveability Rankings
B. Outputs		
2.2.1. Air quality	PM 2.5 levels	WHO
2.2.2. Water quality	0 – 100, 100 = best	Economist Intelligence Unit analysis
2.2.3. Life expectancy	Number of years	World Bank; local data sources
2.2.4. Infant mortality	Deaths per 1,000 live births	World Bank; local data sources
2.2.5. Cancer mortality rate	Age-standardised mortality rates per 100,000 - all cancers, both sexes, ages 0-69	IARC, WHO
2.2.6. Number of attacks using biological, chemical or radiological weapons	Average annual attacks over the past ten years	Global Terrorism Database
2.2.7. Emergency services in the city	0: No emergency services available, or more than 1-hour for emergency response time 1: An emergency response time of between 10 minutes - 1 hour 2: An emergency response time of less than 10 minutes	Economist Intelligence Unit analysis





3. Infrastructure security			Weight: 25%
A. Inputs			
Indicator	Unit	Source	
3.1.1. Enforcement of transport safety	0 – 10, 10 = best	WHO; Economist Intelligence Unit analysis	
3.1.2. Pedestrian friendliness	0 – 5, 5 = best	Economist Intelligence Unit analysis	
3.1.3. Disaster management/ business continuity plan	1 – 5, 5 = best	Economist Intelligence Unit analysis	
B. Outputs			
3.2.1. Deaths from natural disasters	# / million / year, average of the last five years	EM - DAT	
3.2.2. Road traffic deaths	# per million population	WHO; local data sources	
3.2.3. Percentage living in slums	% of city population	UN HABITAT; local data sources	
3.2.4. Number of attacks on facilities/ infrastructure	Average annual attacks over the past ten years	Global Terrorism Database	
3.2.5. Institutional capacity and access to resources	0-1, 1 = best	Economist Intelligence Unit analysis	
3.2.6. Catastrophe insurance	0: No; 1: Yes (either at the national or sub-national level)	Economist Intelligence Unit analysis	
3.2.7. Disaster risk-informed development	0: No (disaster risk has not been accounted in either national economic development plans, or in city-level urban planning) 1: Partially: only in the active national development plan/strategy 2: Yes, to both: accounted for in both the active national development plan/strategy and in city-level urban planning (eg, through policies, directives, urban development plans/ strategies)	Economist Intelligence Unit analysis	
3.2.8. Air transport facilities	0-4, 0 = best	EIU's Operational Risk Model and country-level research	
3.2.9. Road network	0-4, 0 = best	EIU's Operational Risk Model and country-level research	
3.2.10. Power network	0-4, 0 = best	EIU's Operational Risk Model and country-level research	
3.2.11. Rail network	0-4, 0 = best	EIU's Operational Risk Model and country-level research	
3.2.12. Cyber-security preparedness	0-4, 0 = best	EIU's Operational Risk Model and country-level research	

4. Personal security		Weight: 25%
A. Inputs		
Indicator	Unit	Source
4.1.1. Level of police engagement	0 – 1, 1 = engagement plan, 0 = none	Economist Intelligence Unit analysis
4.1.2. Community-based patrolling	0 – 1, 1 = yes, 0 = none	Economist Intelligence Unit analysis
4.1.3. Available street-level crime data	0 – 1, 1 = yes, 0 = none	Economist Intelligence Unit analysis
4.1.4. Use of data-driven techniques for crime	0 – 2, 0 = none 1 = Partially: yes, they use data-driven techniques but only to assist with surveillance (or analysis) 2 = Yes: use of data-driven technologies for both surveillance and predicting crime	Economist Intelligence Unit analysis
4.1.5. Private security measures	0 – 1, 1 = yes, 0 = none	Economist Intelligence Unit analysis
4.1.6. Gun regulation and enforcement	0 – 10, 10 = strict enforcement	Gun Policy.org, Economist Intelligence Unit analysis
4.1.7. Political stability risk	0 – 100, 0 = no risk	Economist Intelligence Unit Operational Risk Model
4.1.8. Effectiveness of the criminal justice system	Quantitative data; in % points, ≤20%: best score	Economist Intelligence Unit analysis
4.1.9. Hazard monitoring	0 = Neither 1: Only (a) a weather monitoring system 2: Both a weather monitoring system (a), and a multi hazard early warning system (b)	World Meteorological Organization
B. Outputs		
4.2.1. Prevalence of petty crime	1 – 5, 5 = high prevalence	Economist Intelligence Unit Liveability Rankings
4.2.2. Prevalence of violent crime	1 – 5, 5 = high prevalence	Economist Intelligence Unit Liveability Rankings
4.2.3. Organised crime	0 – 4, 4 = high risk rating	Economist Intelligence Unit Operational Risk Model
4.2.4. Level of corruption	Scale 0 – 100, 100 = very clean	Transparency International
4.2.5. Rate of drug use	% of population estimated to be users	UN Office on Drugs and Crime; Local data sources
4.2.6. Frequency of terrorist attacks	Average annual attacks over the past ten years	Global Terrorism Database
4.2.7. Severity of terrorist attacks	Average no. of wounded and killed in terrorist attacks over the past ten years	Global Terrorism Database
4.2.8. Gender safety (Female homicide victims per 100,000)	#	WHO; Local data sources
4.2.9. Perceptions of safety	0 – 100, 100 = perceived as most safe	Numbeo
4.2.10. Threat of terrorism	Rating 0 – 4, 0 = Intolerable, 4 = Acceptable	Economist Intelligence Unit Liveability Rankings
4.2.11. Threat of military conflict	Rating 0 – 4, 0 = Intolerable, 4 = Acceptable	Economist Intelligence Unit Liveability Rankings
4.2.12. Threat of civil unrest	Rating 0 – 4, 0 = Intolerable, 4 = Acceptable	Economist Intelligence Unit Liveability Rankings



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